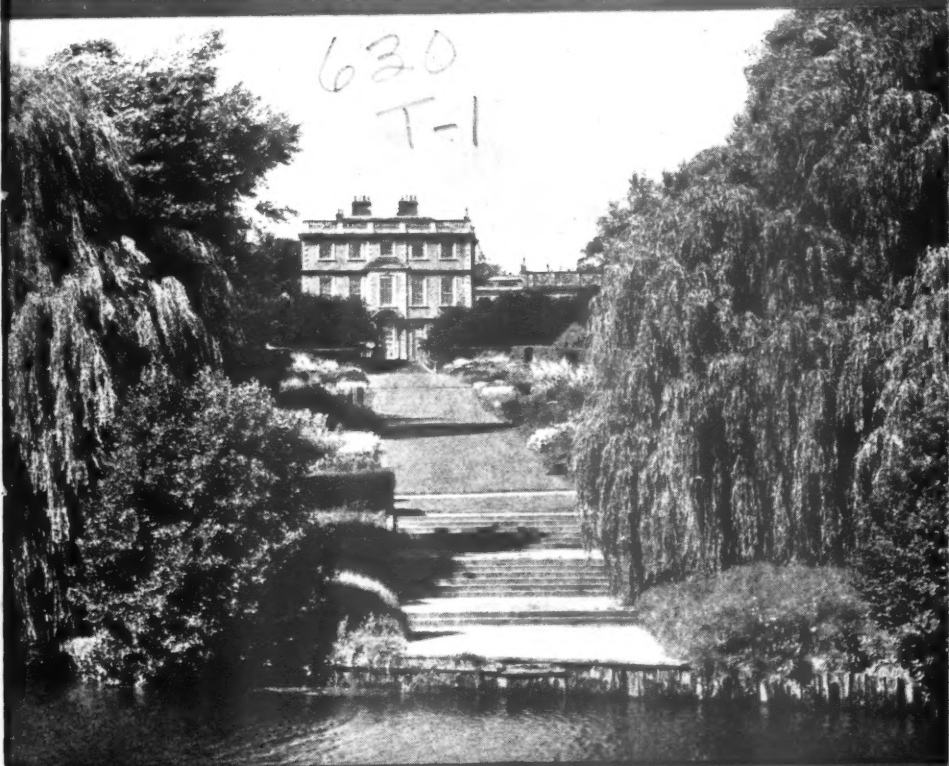


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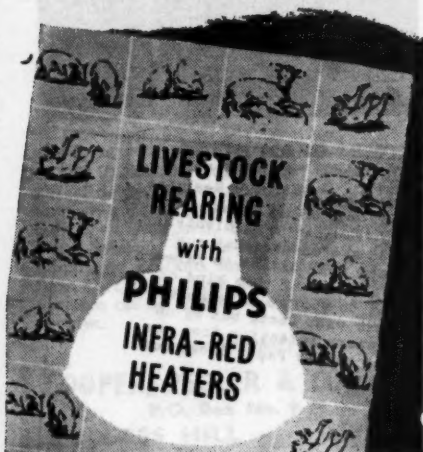
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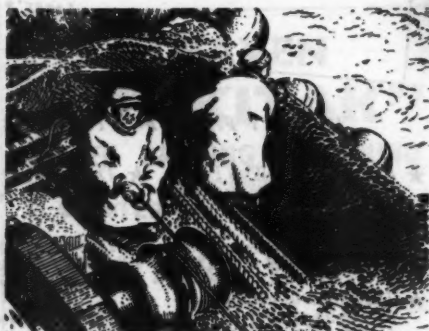
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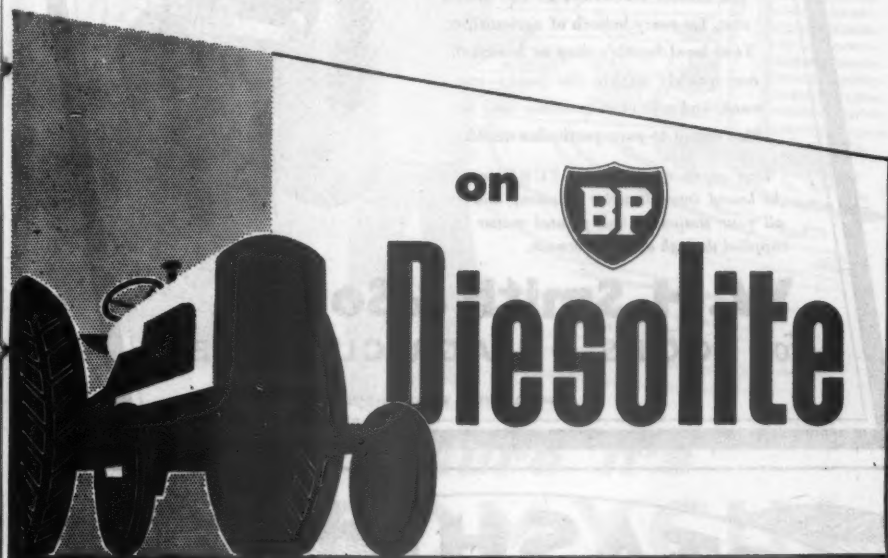
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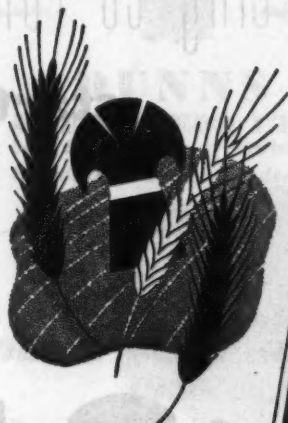
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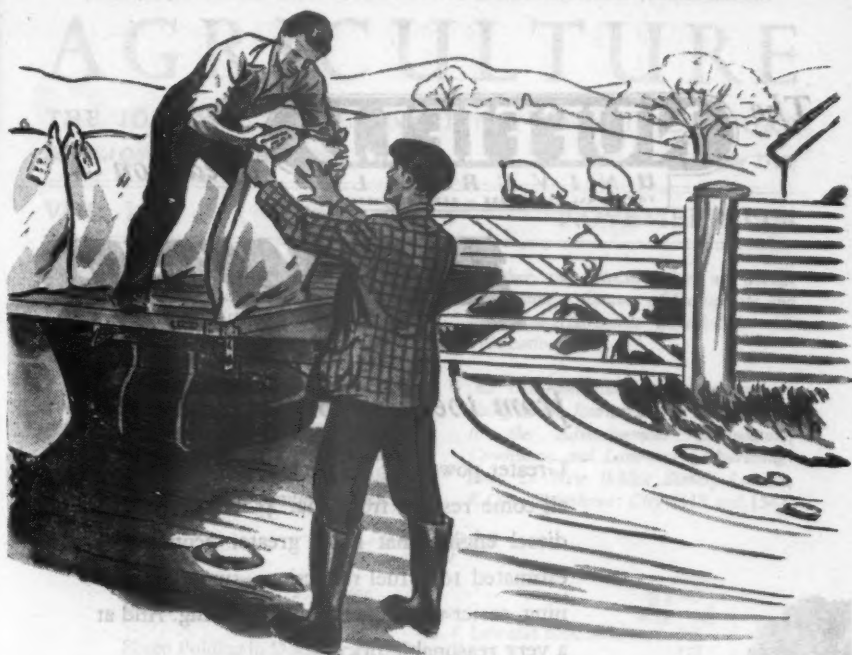
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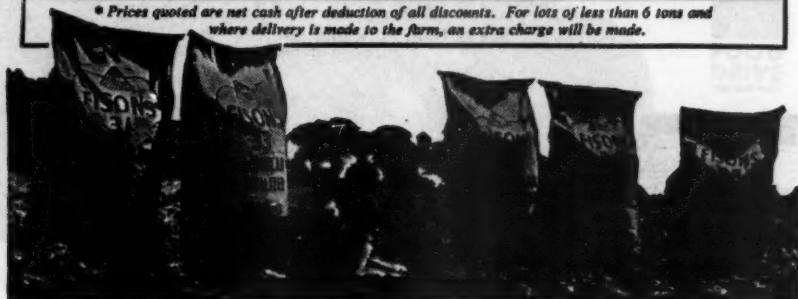
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VOL. LXI

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PIG RECORDING

R. J. GAYTON, N.D.A., N.D.D.

Ministry of Agriculture and Fisheries

A new scheme for National Pig Recording covering England and Wales, was introduced in September. How will it work, and what advantages can the average pig-keeper expect to obtain from it?

THE practice of systematically recording the weights of suckling pigs was first put into operation in Denmark in 1907, and has since become generally known as "pig recording". Subsequently, similar schemes have been introduced in England, Scotland, Northern Ireland, Canada, Germany, New Zealand and Scandinavia, and it is widely acknowledged that results have been very beneficial. For example, the largest pig-recording society in Sweden began in 1923 with 197 sows and 309 litters, but by 1928, 1,853 litters from 1,166 sows were recorded. At the end of those six years, sows in the scheme were rearing, to three weeks old, 0.6 pigs per litter more than in 1923; individual piglets were over $\frac{1}{2}$ lb. heavier, and the overall litter weight showed an increase of 12 lb.

The first organized system of pig recording in Great Britain was started in 1927 by the Animal Nutrition Institute of Cambridge University. It was financed by an annual grant of £800 from the Ministry of Agriculture and the Empire Marketing Board, and operated in Norfolk, Suffolk, Essex, Huntingdonshire and Cambridgeshire. Full-time recorders were employed and the pigs were weighed at six weeks old. The grant, however, was withdrawn in 1931, owing to the financial crisis.

In the meantime, various county schemes sprang up and, by the outbreak of the Second World War, eleven societies were functioning, namely:

Area		Organizers	
Berkshire	.. ..	Berkshire Milk Recording Society	
Cornwall	.. ..	County Agricultural Organizer	
Devon	.. ..	" "	"
East Sussex	.. ..	" "	"
Essex	.. ..	East Anglian Institute of Agriculture	
Hampshire	.. ..	County Agricultural Organizer	
Hertfordshire	.. ..	Vice-Principal, County Farm Institute	
Kent	.. ..	Kent Milk Recording Society	
Leicester and Rutland	.. ..	Leicester and Rutland Milk Recording Society	
Staffordshire	.. ..	Staffordshire Milk Recording Society	
Wiltshire	.. ..	County Agricultural Organizer	

Although financial methods varied, there was one feature common to all the schemes, in that no society was financially supported or assisted by grants from the Ministry. One example will illustrate the general practice. The Wiltshire Society charged 2s. 6d. for each litter weighed. This fee was paid to recorders of the Milk Recording Society, who carried out the work

PIG RECORDING

in conjunction with their ordinary duties. The whole of the clerical work, and the grading of the recorded pigs at bacon factories, was undertaken by members of the County Agricultural Education staff as part of their normal work. The County Council and local bacon factories contributed towards the initial cost of this scheme.

There was, however, no uniformity amongst these societies in the age at which pigs were weighed. The practice varied from four to six, or even eight, weeks. Some operated a second scheme, whereby additional details of the recorded pigs, such as weight for age and carcass quality, were obtained at the bacon factory. Certificates of merit for sows were also issued by a few societies.

In 1933, the Central Council of Milk Recording Societies of England and Wales formulated a standard scheme with model rules, and proposed that the pig-recording movement should be administered through Milk Recording Societies. Litter weighing was standardized at the age of eight weeks, though an additional weighing at three weeks was optional. Subsequently, such pigs would be weighed on arrival at the bacon factory, or on the farm when ready for disposal, either for pork or bacon.

Pig recording lapsed during the war, but in 1949 the Buckinghamshire A.E.C. started a scheme. This was later developed by the Ministry as one of two pilot schemes, the other operating in Shropshire. At the end of 1949, 25 herds were enrolled in the Buckinghamshire scheme, and 251 sows were recorded. By the beginning of 1954, 575 sows were being recorded in 49 herds. The average litter weight had increased from 234 lb. to 264.7 lb., and the average number weaned had risen from 7.49 to 8.11.

The experience gained from the operation of these schemes under post-war conditions was of material assistance in devising the scheme for the whole of England and Wales, which has now been launched under the name of National Pig Records.

The National Scheme In Gt. Britain we have some of the finest pigs in the world, and the export of our breeding stock to other countries has improved the indigenous breeds to such an extent that some Scandinavian countries, for instance, have for some years been able to compete with us in our own markets. However, there are good and bad strains in our pigs, and, to increase the profitability of the home industry, it is essential to weed out the poor strains and exploit the best. The Ministry of Agriculture has therefore organized the National Scheme to encourage and assist breeders to do just this, and also to bring about improvement in pig husbandry generally.

The objects of the new scheme are, broadly speaking :

1. to measure the reproductive capacity and mothering ability of sows ;
2. to record the liveweight gain of the young pigs ;
3. to make an assessment of the quality of the carcass ;
4. to measure the efficiency of the general management of the pig-keeping enterprise.

For the purpose of administration, England and Wales have been divided into sixteen areas, fourteen in England and two in Wales. A Pig Recording Officer will be in charge of the scheme in each area. The scheme is, of course, voluntary for breeders of both pedigree and non-pedigree pigs; the only charge is five shillings per litter born. Clerical work to be done on the farm has been reduced to the minimum.

PIG RECORDING

When an intending member has expressed a wish to join the scheme, he will receive a visit from the Pig Recording Officer, who will take particulars of the herd, including earmarks and the pedigrees of the sows and gilts. *All* sows and gilts in the herd must be recorded. Non-pedigree sows and gilts will be tattooed in the left ear by the Pig Recording Officer at the time of his visit. The member will then be provided with a book of Forms "A" and "B". Notification of the birth of every litter must be made, within seven days, on Form "A". Weighing of the piglets in each litter, when 21 days old, is optional, but if the member has agreed to weigh at that stage he will be reminded by the Pig Recording Officer. The weights should be recorded on Form "B". Weighing of each piglet in the litter at eight weeks old is, however, compulsory, and each member will be notified of the time and date for weighing.

The basis of the scheme is weighing by the member himself: the Pig Recording Officer, or an assistant, will not attend *all* weighings, although he will be present at some to check the weights. After completion, Form "B" should be posted to the Pig Recording Officer before the pigs attain the age of nine weeks. When the details have been recorded in the area office, the form will then be returned to the member for retention as a permanent record.

Non-pedigree litters must be given an identification mark at the time of weighing, and for this purpose members will be required to tattoo the earmark of the dam in the right ear of each piglet. It will thus be possible to trace each pig through to the bacon factory. The system of tattooing will incorporate a letter, denoting the area in which the herd is located, followed by a number. If a gilt is kept for breeding from a non-pedigree sow, she will bear her dam's tattoo number in her right ear, and when she enters the breeding herd she will be tattooed by the Pig Recording Officer in the left ear with her own individual earmark.

Complete Life History of every Sow It is the object of the Ministry's scheme to compile a complete life history of every recorded sow, together with the records of all her litters, from birth to slaughter. To achieve this, it is most important that the sale of all recorded animals should be notified by the member to the Pig Recording Officer. Members will be supplied with the appropriate forms, which are addressed and stamped for return to the Pig Recording Officer. In the case of bacon pigs, the member should post the completed form to the bacon factory before the dispatch of the pigs, so that the date of slaughter, their weights and grades can be entered by the factory grader.

If boars and gilts are sold into another area of England and Wales, full particulars of their pedigrees, and all known recorded history, will be transferred to the records in the area to which the animals are sent. It will thus be possible to assemble the complete life history of any pedigree-recorded animal, and for the Pig Recording Officer to issue a "Record of Productivity" to a member in respect of any of the animals in his herd. This record will give not only the performance of the sow, but also those of her dam, and her paternal and maternal grand-dams. The records of all the progeny of the sire and of the paternal and maternal grandsires—so far as they are known—will also be shown. The records will be issued free if due notice is given to the Pig Recording Officer for the area, and should prove of great value for selection of stock.

PIG RECORDING

Nominated Boar Scheme The Nominated Boar Scheme is devised as an optional extension of the main scheme. Any member with a pure-bred herd may nominate one or more of his stock boars. Three litter groups, sired by the nominated boar, of four pigs each (two male and two female) will be selected from the litters of unrelated sows. The choice of the litter groups will be agreed between the member and the Pig Recording Officer. The member will rear and fatten these litter groups, recording the liveweight gain at regular intervals throughout the fattening period. When the groups are sent for slaughter, at the usual bacon weight, detailed reports on each carcass will be obtained from the factories. If the member wishes, arrangements will be made for the recording and costing of food consumption during the feeding period.

This scheme is not intended to take the place of progeny testing but, by giving a measurement of the rate of liveweight gain for age in three litter groups by the same boar during the same period, it should usefully indicate outstanding strains which might well be considered worthy of being selected for a progeny-testing station. Pig Recording Officers will be in close touch with local N.A.A.S. officers, and the resources of the whole of the Ministry's Advisory Services will be available for pig breeders, according to the particular problem that may arise.

FOLIAR APPLICATION OF NITROGEN ON GRASSLAND

A. J. LOW, M.Sc., M.Sc. (Agric.), A.R.I.C.
and

E. R. ARMITAGE, B.Sc.

Jealott's Hill Research Station, Bracknell, Berks

Experiments at Jealott's Hill show that, contrary to claims that have been made elsewhere, there appears to be no advantage in terms of dry matter or crude protein to be gained from applying nitrogen to leys as a foliar spray instead of in the more conventional solid form.

PLANTS obtain most of the elements they require from the soil through their root systems. For maximum crop yields it is usually necessary to supply extra quantities of nutrients such as nitrogen and phosphorus, the normal method being to apply them to the soil so that the plants will have a reserve upon which to draw as growth proceeds. Unfortunately, the soil is not a good storehouse of plant nutrients: nitrogenous fertilizers may be leached away by rain; phosphate fertilizers usually react with the soil to form compounds which are not readily available to most farm crops; and the same applies, although to a less extent, to potash fertilizers. The micro-nutrients, which include zinc, iron, copper, etc., may also be "fixed" in the soil in relatively unavailable forms.

It has been shown experimentally that all the elements known to be essential for plant growth can enter through leaf surfaces. Indeed, for many years micro-nutrient deficiencies appearing in fruit trees have been corrected by foliar application of suitable solutions rather than by solid applications, as the symptoms have disappeared more quickly when the former method

FOLIAR APPLICATION OF NITROGEN TO GRASS

has been used. Are there conditions when foliar application of the major nutrients, such as nitrogen, is likely to be more effective than solid application?

There are several points to be considered. First, micro-nutrients are required only in very small quantities. While a few pounds, or even ounces, per acre of a micro-nutrient may be enough to correct a visible deficiency, the usual dressing of a nitrogenous, phosphatic or potassic fertilizer is measured in hundredweights. Even if all the nitrogen (for example) in a foliar application entered the plants, compared with the 30-50 per cent that is usually assumed to reach them from soil application, the amount needed per acre would still be large. But the volume of solution in a foliar application must be limited to the amount required just to wet the plants. On grassland and most arable crops this sets a limit of about 20 gallons per acre. If frequent spraying is to be avoided, then highly soluble concentrated fertilizers will have to be used. This introduces another difficulty, for such solutions may cause damage to the leaves. Another point is that for successful foliar applications the plants must be at the stage when they cover the greater part of the soil surface.

The immediate response to solid fertilizers applied to the soil during dry weather is usually small, and it has been suggested that a much better response might be obtained at such times from foliar applications, whereby there might be a rapid absorption of nutrients into the plants.

Purpose and Design of the Experiments In the last few years an attempt has been made at Jealott's Hill to get answers to some of the problems which have just been posed. The work is part of a general programme of research on foliar nutrition. As reasonably clear-cut results have been obtained in some of our grassland work, we have thought it desirable to publish the results, particularly as they are not in agreement with some obtained in other parts of England.

Harris⁽¹⁾, who described trials in which mixtures of MCPA weed-killer and plant nutrients were sprayed from aircraft on weedy pastures, stated, for example, that : "it was hoped that a more efficient utilization of the fertilizer would result from leaf absorption of the spray material and that an effect comparable to a ground application of 1 cwt. sulphate of ammonia and about 3 cwt. superphosphate would be obtained, plus the herbicidal effect of 3 lb. MCPA." The amount of nitrogen and phosphorus applied in the sprays was not quoted, nor were any detailed results.

Other articles have made more specific claims about the effects of foliar sprays. One is that "a given amount of nitrogen or phosphorus applied by this method (that is, as a foliar spray) is equivalent in its effectiveness to four or five times the quantity applied in the conventional manner as a dry dressing."⁽²⁾

The aim of the field experiments described here was to compare the effects of nitrogen fertilizer applied as a solid in the usual way with the same amount sprayed in solution on the leaves. Urea was used because of its high solubility in water and also because in earlier experiments it had been found to cause less damage to clover plants than solutions of ammonium nitrate supplying the same amount of nitrogen in the same volume of water. This may be due to the lower osmotic pressure of the urea solution, as compared with the ammonium nitrate.

The urea solution was applied at 20 gallons per acre. This was sufficient to wet the leaf surfaces without appreciable run-off to the soil. In practice,

FOLIAR APPLICATION OF NITROGEN TO GRASS

88 lb. urea (40 lb. N) dissolves readily in 13.4 gallons of water at 10°C. to give 20 gallons of solution.

In each of the experiments, urea equivalent to nitrogen at 0, 10, 20 and 40 lb. per acre was applied in three ways :

1. broadcast as fine crystals,
2. sprayed in aqueous solution,
3. sprayed in aqueous solution with the addition of 0.1 per cent of a liquid spreader.

Each treatment was replicated four times and the plots were arranged in randomized blocks. The main plots, which received the four rates of urea, were each divided into three for different methods of application. The area of individual plots was approximately 24 sq. yards (0.005 acre). The foliar applications were made at a constant pressure of 30 lb. per sq. inch, maintained with a compressed air cylinder.

Results on a Grass-Clover Ley The first experiment on a grass-clover sward was conducted in 1952 on a ley in its second year. On April 17, when the first nitrogen application was made, the herbage was about 4 inches high and contained 30 per cent clover (mostly S.100), 65 per cent perennial ryegrass (S.23) and 5 per cent timothy (S.48 and S.51). The weather at the time of spraying was dry, warm and sunny, and rain did not fall until thirty hours after spraying was completed ; even then there was only a trace.

Three days after applying the urea as a spray, the clovers were scorched but the grasses were only slightly damaged. The higher the rate of nitrogen the greater the amount of scorching, and the inclusion of a spreader appeared to increase it still further. No damage from solid urea was observed at any of the nitrogen rates. The plots were cut on May 13 and resprayed on June 4. This three-week interval was necessary to obtain sufficient leaf area for the second foliar application. Damage to the herbage was much the same after a second spraying, and again after a third in late summer.

The experiment was repeated with a similar sward on a fresh site in 1953 and similar field observations were made. The total yields of grass and crude protein for each year are given in Tables 1 and 2.

Table 1
Yield of Dry Matter (cwt. per acre)

NITROGEN TREATMENT (lb. N per acre per cut)	METHODS OF APPLICATION					
	1952 (sum of 3 cuts)			1953 (sum of 3 cuts)		
	Solid	Foliar Spray	Foliar Spray with Spreader	Solid	Foliar Spray	Foliar Spray with Spreader
0	73.1	73.1	73.6	75.3	76.8	76.8
10	73.9	75.6	75.9	77.9	74.4	81.3
20	77.4	75.9	75.9	77.2	80.8	84.4
40	84.5	83.1	80.5	89.0	77.1	82.8

Standard error (single plot)	1952		1953	
	Main plots ±2.4	Sub-plots ±4.1	Main plots ±3.1	Sub-plots ±4.8

FOLIAR APPLICATION OF NITROGEN TO GRASS

Table 2
Yield of Crude Protein (cwt. per acre)

NITROGEN TREATMENT (lb. N per acre per cut)	METHODS OF APPLICATION					
	1952 (sum of 3 cuts)			1953 (sum of 3 cuts)		
	Solid	Foliar Spray	Foliar Spray with Spreader	Solid	Foliar Spray	Foliar Spray with Spreader
0	9.50	9.72	9.66	12.86	13.05	12.82
10	9.62	10.49	10.13	12.70	11.97	13.94
20	10.26	10.07	9.57	12.50	13.89	14.23
40	11.47	10.57	10.32	15.20	13.19	13.50

Standard error (single plot) 1952 1953
Main plots Sub-plots Main plots Sub-plots
±0.55 ±0.80 ±0.40 ±1.06

In 1952 the differences in the yields of dry matter and crude protein resulting from the three methods of application were not significant. In 1953 such differences as existed (although not systematic) indicated that foliar spray (without spreader) gave lower yields than the other methods.

The effects of the treatments on the amount of clover in the swards are given in Tables 3 and 4.

Table 3
Percentage of Clover in Sward in 1952

NITROGEN TREATMENT (lb. N per acre per cut)	BEFORE FIRST SPRAY	AT LAST CUT			
		Methods of Application			
		All Plots	Solid	Foliar Spray	Foliar Spray with Spreader	Means
0	30	46	51	50	49
10	30	29	34	31	31
20	30	28	29	24	27
40	30	14	17	12	14
Means	30	29	33	29	—

Standard error (single plot) Main plots Sub-plots
 ±3.7 ±3.9
Sig. diff. between method means : 3
Sig. diff. between N rate means : 6

Table 4
Percentage of Clover in Sward in 1953

NITROGEN TREATMENT (lb. N per acre per cut)	BEFORE FIRST SPRAY	AT LAST CUT			
		Methods of Application			
		All Plots	Solid	Foliar Spray	Foliar Spray with Spreader	Means
0	31	38	41	34	38
10	32	29	33	29	31
20	31	29	35	28	30
40	30	24	22	26	24
Means	31	30	33	29	—

Standard error (single plot) Main plots Sub-plots
 ±2.3 ±5.9
Sig. diff. between method means : not significant.
Sig. diff. between N rate means : all differences significant.

FOLIAR APPLICATION OF NITROGEN TO GRASS

Here again, there was little difference between the three methods. The decrease in clover content with the increasing rate of nitrogen was probably due to the competition from the more vigorously growing grasses.

It is important to note that over the two years of the experiment, the weather, both at spraying time and otherwise, was very varied.

Trials with a Pure Grass Ley To avoid the complication of clover, an experiment was conducted on an Italian ryegrass sward. This ley was established on old arable soil deficient in nitrogen, so that a good response to this element could be expected. The soil was well supplied with phosphorus, potassium and calcium. The Italian ryegrass was sown in the spring of 1952 and, after germination, was given a dressing of 2 cwt. "Nitro-Chalk" per acre. The design of this experiment and the treatments were exactly the same as those for the clover-grass ley.

Owing to very dry weather, growth was slow and only one spraying was carried out in 1952. Little or no damage to the herbage was observed from any rate or method of application of nitrogen. There was a good response, both in terms of dry weight and crude protein. The experiment was continued on the same plots in 1953, and the results are given in Tables 5 and 6.

Table 5

Yield of Dry Matter (cwt. per acre)

1952-53 (sum of 3 cuts)

NITROGEN TREATMENT (lb. N per acre per cut)	METHODS OF APPLICATION			
	Solid	Foliar Spray	Foliar Spray with Spreader	Means
0	37.9	38.8	39.3	38.7
10	44.2	47.2	44.9	45.4
20	53.7	52.2	49.2	51.7
40	61.2	59.7	61.6	60.8
Means	49.3	49.5	48.7	—

Standard error (single plot)

Main plots
±4.75

Sub-plots
±3.35

Table 6

Yield of Crude Protein (cwt. per acre)

1952-53 (sum of 3 cuts)

NITROGEN TREATMENT (lb. N per acre per cut)	METHODS OF APPLICATION			
	Solid	Foliar Spray	Foliar Spray with Spreader	Means
0	3.43	3.48	3.50	3.47
10	4.06	4.06	3.92	4.01
20	5.18	4.68	4.55	4.81
40	6.16	5.71	5.91	5.93
Means	4.71	4.48	4.47	—

Standard error (single plot)

Main plots
0.41

Sub-plots
0.33

FOLIAR APPLICATION OF NITROGEN TO GRASS

The differences in the yields of dry matter and crude protein resulting from the three methods of application were again not significant.

Some Conclusions From these experiments it would appear that there are no advantages in terms of dry weight or crude protein to be obtained by applying urea to leys in solution as a foliar spray instead of in the form of the conventional solid top dressing: similar yields are obtained by both methods. The response from foliar application of urea solution in dry weather also appears to be no greater than that from solid application made in the usual way.

On the question of damage to plants, it was shown that whilst solid applications of urea—for example, the equivalent of $2\frac{1}{2}$ cwt. "Nitro-Chalk" per acre—can be applied to a clover ley without causing any apparent damage to the herbage, foliar application with a corresponding amount of urea in solution causes considerable harm to the clover plants, although damage to grass appears to be negligible.

Finally, it is pertinent to point out that the cost of spraying with urea, which is considered to be the most suitable nitrogenous compound available, is substantially greater than that of top dressing with the usual solid nitrogenous fertilizers.

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SHEEP FOLDING IN DORSET

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Farming economics of the past fifteen years has not favoured arable sheep generally, but the tradition of folded flocks is still being carried on successfully at the Dorset Farm Institute.

WHEN Stinsford Farm was let to the Dorset Farm Institute in 1948, a pedigree breeding flock of 200 Dorset Horn ewes was taken over from the previous tenant. The flock had been entered in the first volume of the Association's register in 1892. This same flock is still on the farm today, and is now the oldest established in the breed. It has provided rams to a large number of Dorset Horn flocks, and many of the highly priced rams sent to all parts of the world have had Stinsford blood in them.

The land is eminently suited to sheep, for it is light and free-draining, a large proportion being overlaid with gravel and flints. The idea of the "golden hoof" is not ridiculed by men who are farming such land, for it has undoubtedly helped to keep the shallow dry soils on the Dorset hills productive, whilst at the same time lessening their dependence on chemical fertilizers.

At the outset it was decided that the sheep enterprise should be kept, and that the traditional method of folding be continued. It is a system of High

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Farming in which a heavy outlay is inevitable, and this can only be justified if the output is proportionately high. Intensive folding involves high labour costs, expensive materials, and more attention to detail in management.

By folding any class of livestock, a heavier rate of stocking can be maintained than would otherwise be possible without jeopardizing health. In this flock, foot rot is unknown, and no sheep is ever dosed for worms nor are there any signs that a dosing routine would be worth while. A recent worm count revealed only a very slight infestation in the ewes, and a negligible count so far as the hogs were concerned. We attribute this almost entirely to the natural control of parasites through the effective use of the plough, and by bringing forward the hurdles behind the flock to prevent the sheep wandering on to stale and contaminated land. These were our reasons for deciding to continue a practice which, in some areas, has become dangerously near to being laughed out of existence.

The acid test is one of profitability, and of this there is no doubt; for the sheep have compared favourably with other enterprises on the farm during the past five years of costing. The following details summarize the annual financial results during these years, no account having been made of the obvious benefit which sheep folding confers on succeeding crops in the rotation. The average number of breeding ewes in the flock during this time has been 204.

							£	s.	d.
Gross output per ewe	..	..	..	..	..	..	15	10	0
Profit per ewe	..	..	..	..	..	..	2	16	0
Resources used per £100 output (or Economy of Expenditure)	..	..	..	..	..	..	82	4	0
Profit per £100 capital invested	..	..	..	..	..	..	12	0	0

Grazing and Trough Feeding The flock is folded throughout most of the year over leys which normally provide good keep from the middle of April until the middle of November. By taking advantage of the improved strains of grasses and clovers now available, it should be possible to extend the grazing season still further at both ends. In particular, the New Zealand short-rotation ryegrass (H.1), is most valuable for this purpose. Sheep prefer a ryegrass mixture to one which is predominantly cocksfoot, although cocksfoot, admittedly, has great advantages in dry times, especially on the chalk hills. During the autumn, stubble grazing, coupled with the scavenging of fodder beet and sugar beet tops, helps to avoid waste and provides some good keep. From December onwards the flock is folded over 35 acres of kale and swedes, drilled at two lb. marrowstem kale, two lb. thousand-headed kale, and two lb. swedes per acre. These roots are grown cheaply by using the steerage hoe frequently between the drills, and by carrying out early cross cultivations with a weeder or spring tine cultivator to thin the plant, thus eliminating any need for hand-hoeing. The crop is charged to the enterprise at £20 per acre. Ten acres of rape are usually broadcast after early potatoes, providing good keep, for the hogs outwinter at a time when they are cutting their first permanent incisor teeth.

During the past few years trough food has been supplied almost entirely from home-grown sources. The dredge corn mixture, which is also fed to cattle and poultry, is made up of two bushels Eagle oats, one bushel Kenia barley, one bushel Fylgia wheat, and half a bushel Minerva maple peas. This is crushed and fed to the ewes from lambing time until the lambs are weaned, usually on March 1, when the amount fed is gradually reduced, depending on the amount of spring grass available. Throughout the winter, the sucking

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lambs are being fed in creeps ahead of the flock. In all, 2 cwt. of dredge corn and 1 cwt. of hay are required per adult sheep throughout this winter feeding period. The last two weeks of April and the first two in May can be very lean times for ewes on some farms but, if they are kept in good condition during this period, they may well add a pound of wool by June 1, and the crop of lambs in October will certainly be larger. If the growth of spring grass is delayed, some catch crop during the hungry gap period is essential, especially if excessively hard grazing is to be avoided, for this may be very harmful to subsequent pasture quality and productivity; on the other hand, judicious grazing and treading of new leys can be a most valuable factor in establishment. *Trifolium*, sown on the stubble after corn, provides a great deal of bulk and palatable food in the spring and, when consumed, kale can be sown in June or early July. Similarly, rape and Italian ryegrass also help to lessen the dependence of the flock on spring grass.

Flexible Folding The practice of strip grazing cattle on grass is alleged to make a saving of 20 per cent; similarly, the folding of sheep makes for more efficient and complete utilization of food than is otherwise obtained, thus making it possible to carry more sheep to the acre. More uniform dunging of the ground is obtained, as the sheep is prevented from lying nightly on the spot of its choice. There are still some shepherds who pitch a "night" fold on the arable land to save spoiling fresh food, but this is carrying the idea, and the hurdles, too far under present-day conditions. We are attempting to introduce a more flexible system of folding, particularly during the summer months, by allowing the flock to run a field occasionally. This has the added advantage of providing the essential exercise needed during pregnancy. The use of cheaper equipment than hurdles, which cost us over £100 per year, and the abandonment of slavish adherence to a policy of daily folding all the year round, may be the answer to those who recognize the technical advantages of the system, but doubt its economic value.

The work of the R.A.S.E. in encouraging the development of new techniques in fencing is timely, and will do much good. The method devised by Mr. S. J. Bone, of Cirencester, has great possibilities. This comprises 25 or 50 yard lengths of electrified netting two feet wide, automatically linked by unbreakable insulated spreaders on metal or wooden posts. The cost per 50 yards with steel stakes and accessories is £6, or one-third that of hurdles. Although wire netting has certain difficulties where horned sheep are concerned, it is, of course, very much cheaper than hurdles, and, whilst paying for itself in a year, will outlive a hurdle by at least five years. We are now using two strands of electric wire with a few hogs which were introduced to the idea soon after shearing. This is proving quite successful on grass, both as a forward and back fence. But the value of the traditional hurdle should never be overlooked as an effective fence, and as shelter against the prevailing winds and rain on the exposed Downs.

Routine It is common knowledge that the Dorset Horn can be managed so as to lamb in the early autumn, or in fact at almost any time of the year. This, coupled with their splendid milking qualities, makes it possible to produce high quality lambs out of season. The rams are put amongst the flock during the middle of May, and lambing starts in October. The wether lambs are sold fat from February onwards, providing valuable carcasses, and dressing out at 50 lb. Here is a way of avoiding seasonal gluts in lamb and mutton production. There is no animal more subject to seasonal gluts than the sheep, and it is up to the farmer to avoid them by aiming at getting his sheep fat when nobody else has them ready. The consumers' preference for

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fresh meat, as distinct from the chilled or frozen product, is well established, and the effects of a free market will almost certainly tilt the scales once again in favour of an Easter lamb trade. Our five-year lambing percentage, which takes into account the number of lambs reared from the number of ewes put to the ram, has averaged 133 per cent. Dorset Horn ewes are prolific, but unless some shelter, usually thatched hurdles, is provided against the driving autumn rain, many lambs can be lost through chills. The flock rears its own replacements, the surplus ewe lambs and hogs being sold at the annual May Fair in Dorchester, together with the full-mouthed ewes which have had three crops of lambs. These sheep sell well and realize good prices in response to the demand for crossing, particularly with Down rams. These regular draft ewes are often taken to grass farms, where they may raise two sets of twins in one year, for the ewe will take the ram while she still has a lamb at foot. But this is not a practice to be adopted with a pedigree breeding flock, since constitution and size would ultimately suffer.

This year ram lambs have also been bred for sale at the Fair. The pure-bred Dorset Horn is remarkably prepotent, as the breed is one of the purest still in existence. It is probable that no other breed has had any influence in its development, for it has been evolved by selection within the old breed known as the Wiltshire Nott, which roamed the downs of Dorset many years ago. It matures quickly, and this rapid growth character is carried over strongly into the cross-bred lamb; consequently, the rams are used widely as fat lamb sires, very often on hill sheep. There is some concern that better prices are often paid for this purpose than for rams to be used in the pedigree breeding flocks. This is probably because many breeders arrange to exchange ram lambs between flocks without any financial consideration.

The flock is under the charge of a full-time shepherd, but the cost of the labour spent on the flock over twelve months amounts to over £600. This includes all the additional help involved at such times as lambing, shearing and dipping, and in moving equipment from one field to another. A full-time shepherd ensures proper supervision the whole year round, promoting better health and better results, particularly at lambing time, than is possible with a smaller flock where attention is more casual.

The wool is particularly attractive and makes a good price. Picked washed wool this year (grading 56/50s) has fetched 81½d. per lb. The wool is as fine as that of any of the Down breeds, excepting only the Southdown and Dorset Down. The entire flock is washed in clear running water a week before shearing, and this brings a reward of 16½d. per lb. over unwashed wool of the same quality, besides making the job of shearing easier because of the reduced grease in the wool. Against this must be set the reduced weight of the fleece, variously estimated as between 12 and 20 per cent. The adult sheep provides an average clip of 5½ lb., worth, therefore, about 37s. 6d. : the lambs are also shorn in their first summer and clip 3½ lb., fetching 62½d. per lb.

Downland Tradition There is nothing novel about the way in which sheep are kept at Stinsford Farm. On the contrary, the so-called "arable sheep" have played a most important part in history. They were created by the men of the Agricultural Revolution to play their part in a well-balanced farming system, forsaking the pastures for the root crops of the new rotations. Dorset is a county whose tradition is based on sheep and corn growing, more particularly the folding of sheep on arable crops and the production of high quality malting barley. It was Daniel Defoe, riding solitary and observant through the English countryside at the beginning of the eighteenth century, who commented on the pleasant downs within a six-

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mile radius of Dorchester, and how half a million sheep grazed there. The position is very different today, for the decline in the national sheep population has been most marked amongst folded flocks on the Downs. The reasons for this are well known—in particular, the relative profitability of milk and corn, coupled with the shortage and expense of labour able and prepared to care for sheep. This is a system of farming which has been hard hit by the economics of the twentieth century, but one which, even today, can be a sound proposition where the land, climate, and cropping is suitable, as some Downland farmers are again beginning to realize.

GOOD ESTATE MANAGEMENT

NEWBY HALL

THE WEST RIDING HOME OF MAJOR EDWARD R. F. COMPTON

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ON both sides of the gently flowing Ure, between the cathedral city of Ripon and the important road junction of Boroughbridge, lies a compact agricultural estate of 7,000 acres; it is owned by Major Edward R. F. Compton and managed by Mr. F. G. Apedaile. Newby Hall, from which the estate takes its name, stands on the north bank of the river half way between the two towns. The estate existed in the thirteenth century, when it was owned by the De Nubie family. About 1705 Sir Edward Blackett, M.P., and eldest son of the Mayor of Newcastle, having acquired the property, built the main block of the present Hall at a cost of £32,000. In the middle of the eighteenth century William Wendell bought the estate, and between 1765 and 1783 engaged Robert Adam, that great Scotsman and improver of English architecture, to redesign and extend the house. Adam, while preserving the beauty of the Wren-like architecture, added some magnificent neo-classical wings, a stable block, and the main entrance. Subsequent alterations were made after the estate had passed to the first Lord Grantham, later Earl de Grey. These extensions, which were carried out in 1802, fell short of the perfection shown by Robert Adam, but the beauty of the house was not impaired.

Earl de Grey gave the estate to his daughter, who married Mr. Henry Vyner of Gauthy in Lincolnshire. It later passed to the daughter of Robert de Grey Vyner, Lady Alwyne Compton, and then to her son, the present owner, Major Edward Compton. Major Compton divides his time between Newby Hall and the Isle of Mull, where he farms about 7,000 acres. A keen botanist, Major Compton laid out the gardens at Newby Hall between the wars and always keeps in close touch with the day-to-day work of the gardens, as well as the management of the estate as a whole.

Part of Newby Hall was converted into flats in 1948 and 1949, and the stable block was let to a racehorse trainer. A large part of the Hall and grounds are open to the public at certain times during the summer, and the visitors provide a considerable income, relieving to some extent the burden of repairs, maintenance, and taxation carried by the mansion. The fears which Major and Mrs. Compton had before the house was opened have

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largely proved unfounded ; there has been no litter problem, and curiosity has been refined by interest and respect.

Thirty-six Farms This 7,000-acre estate lies between 50 and 250 feet above sea level. The soil varies from blowing sand to heavy clay ; the lightest land is in the north of the estate, and varies through medium loam to alluvium along the north bank of the river. On the south side of the river there is strong clay. The average rainfall is 28.6 inches.

The estate includes two villages, Skelton-on-Ure and Marton-le-Moor, which contain many "tied" cottages. The other houses are let at controlled and uneconomic rents of about 2s. 6d. per week. Local authorities are given every encouragement to acquire sites for building council houses, but the ownership of these villages is a liability to the estate. The unit is divided into 36 farms, all let, and varying from 40 to 400 acres. On the south side of the river milk production is the main type of farming; mixed, mainly arable, farms are found to the north.

The mixed arable farm of Givendale Grange, which can serve as a typical example, is 340 acres in extent and has been tenanted since 1898 by successive generations of the same family. The present occupier is Mr. J. C. H. Hawking. About 100 acres of this farm is permanent pasture, because of a liability to flood. The remainder is under an arable rotation ; cash crops grown include potatoes, sugar beet, wheat and barley. Four-year leys are sown.

A regular breeding herd of up to eighteen beef-type cows is kept and run with an Aberdeen-Angus bull. The progeny are fattened on the farm on home-grown produce ; no concentrates are bought. Between thirty and fifty strong store cattle are bought every year, wintered in yards and fattened on grass in the following summer.

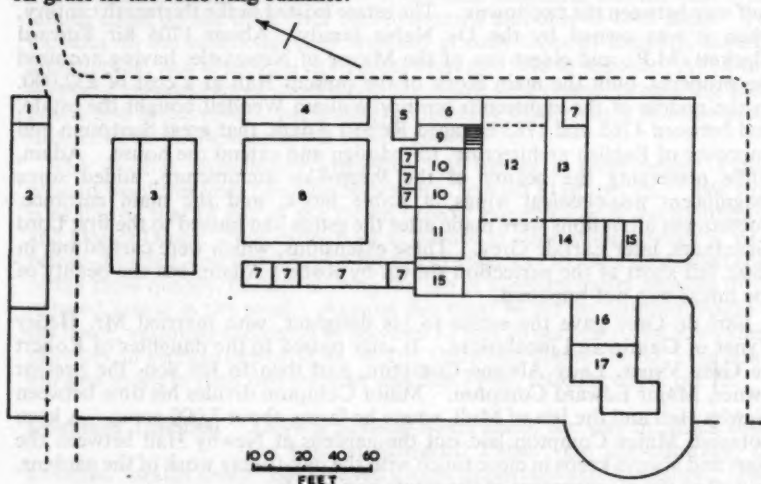


Fig. 1. Block Plan of Givendale Grange Farm

- | | | |
|--------------------------------|------------------------|---------------------|
| 1. Blacksmith's shop | 7. Box | 13. Stable for 8 |
| 2. Tractor and Implement sheds | 8. Yard for 30 beasts | 14. Harness room |
| 3. Three 5-day Dutch barns | 9. Meal room | 15. Garage |
| 4. Cowhouse for 20 | 10. Chaff room | 16. Foreman's house |
| 5. Turnip house | 11. Straw barn | 17. Farmhouse |
| 6. Cart shed | 12. Yard for 20 beasts | |

A granary extends over 5, 6, 9, 10 and 11.

GOOD ESTATE MANAGEMENT : NEWBY HALL

A flock of about 100 half-bred (Cheviot \times Border Leicester) ewes are kept and crossed with an Oxford ram ; the ewes are bought at two-shear and cropped up to six times before being drafted ; the lambing percentage is about 175. All lambs are graded before the first shear ; none are folded on roots. The sheep are hand-fed throughout the year on home-grown cereals. Seven hundred hens are kept, but there are no pigs, except one or two for domestic use.

There are still four horses on the farm, but the bulk of the work is done by one vaporizing oil and three diesel tractors. One tractor is fitted with a hydraulic lift. Mr. Hawking has his own thresher and two binders and the ample Dutch barn and granary space makes it possible to do a day's threshing at any time during the winter. The buildings are well laid out, the hard road and cobbled areas make for easy access to all buildings, and the overall plan is reasonable on labour. The two yards are covered and give a total accommodation for 50 beasts. There is box space for 20 young stock. The stable is for eight horses and the cowhouse for twenty cows, although neither is now fully used. Good roads approach the homestead from east and west and access is easy ; this, however, is a benefit not enjoyed by all the farms on the estate.

Rents and Repairs In 1948 the farm rents were increased by 25 per cent, and in 1953 each farm was valued by an outside valuer and the rents adjusted by agreement thereafter. The demand for farms is keen and when a farm comes to be let it is not difficult to re-let at an increased rental. It is interesting to note that present rents are only some 11 per cent above those in 1875 ; income tax then stood at the happy figure of 2d. in the £ !

Increased rents have allowed the estate to spend more on repairs ; the graph below shows this more clearly. It is also evident that the net return has fallen, in spite of the considerable increases in rent. The estate is actually spending over half the gross rental income on repairs, mainly due, of course, to the accumulation of maintenance as a result of the 1939-45 war. The figure for repairs does not include the cost of management, insurance, or improvements.

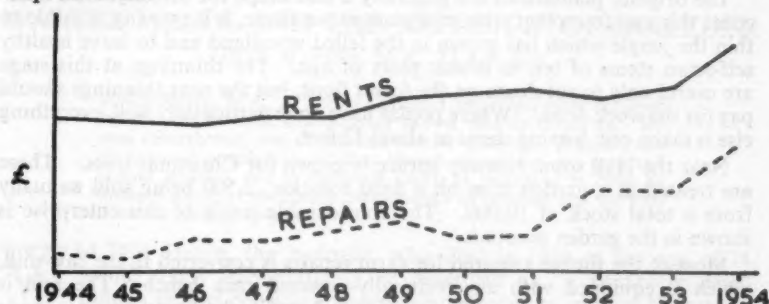


Fig. 2. Relationship between rents and repairs for ten years from 1944.

So far as possible, maintenance repairs are carried out by estate labour, but major repairs and most of the improvement work are put out to contract. The standard estate agreement has now been brought into line with the model clauses under the Agriculture Acts, but it is evident that the parties co-operate to the full, both in carrying out repairs and improvements. For many years the estate has increased a farm's rent by 5 per cent of the overall cost of an

GOOD ESTATE MANAGEMENT : NEWBY HALL

improvement ; 6 per cent is now being charged. The increase is integrated in the farm rental ; no separate fund is sunk for the repair or renewal of any particular item of fixed equipment.

Estate Staff Mr. Apedaile is fortunate in having the help of a clerk who has known the estate for many years. One whole-time clerk is all the help he has in the office. The Agent's practice in keeping in touch with the finance of the estate by personally writing up the cash book is, surely, exemplary.

There are sixteen on the outside staff. Devoting their time to repairs are a mason and mate, a plumber and apprentice, a joiner and one labourer. Three keepers look after both the let shooting and the shooting in hand. The head gardener has five assistants, one casual woman and one full-time woman (Miss Markell), who has worked on the estate for about forty years and remembers the day when the gardens carried a staff of fourteen, each working a 68-70 hour week. There were over thirty people employed at the Hall at that time ; there are now three.

Forestry Of the 7,000 acres, 350 are devoted to forestry. The woodlands are dedicated under the Forestry Commission Covenant, which ensures valuable grants and entails no more onerous obligation than good management, which in any case is the estate policy. The woods were planted and managed mainly as coverts, and no thinning was done until 1948 ; thus the commercial management of the woodlands for timber is a comparatively recent venture, but in the last six years 128 acres have been thinned by contract.

Approximately one-quarter of the woodlands was felled during the war years, but two-thirds of this has since been either replanted or satisfactorily self-sown. European larch, Scots pine, Norway spruce, sycamore, and poplar are the main species which have been planted, while ash, sycamore, poplar and birch have regenerated naturally. The areas of natural regeneration were not fenced against rabbits, and it has been found that rabbits are not damaging the young trees of these four species, except in the hardest frosts.

The original plantations are generally a bad shape for forestry. To overcome this and to replant with minimum expenditure, it is proving possible to thin the jungle which has grown in the felled woodland and to leave healthy self-sown stems of ten to fifteen years of age. The thinnings at this stage are useful only to rot down on the forest floor, but the next thinnings should pay for the work done. Where poplar have done particularly well, everything else is taken out, leaving stems at about 12 feet.

Near the Hall some Norway spruce is grown for Christmas trees. These are treated as a garden crop on a fixed rotation, 2,500 being sold annually from a total stock of 10,000. The considerable profit of this enterprise is shown in the garden accounts.

Most of the timber required for farm repairs is converted in the saw-mill, which is equipped with an electrically-powered rack bench. The mill is worked by a joiner, as there is no woodland staff. Arrangements are made in the contract for felling or thinning to leave a number of marked stems in the yard.

The old antagonism between forestry and game is met on the estate by restricting, as far as possible, work in the woods during the nesting season. It has been suggested that the overdue thinning has probably been beneficial to the shooting, but it is still too early to see how the woodlands, under proper management, will affect the game bag. The sport on this estate has long

GOOD ESTATE MANAGEMENT : NEWBY HALL

been famous, and many eminent shots, including King Edward VII, have enjoyed it.

The Gardens The gardens are run as market gardens, and in 1950 they were increased by five acres of fruit trees, mainly Bramley's and damsons. Some produce is sent to Ripon in the estate van, but vegetables, flowers and fruit are sold to the public who visit the grounds and mansion. The central block of glass has been replaced by an aluminium-framed glasshouse of better shape than the old, narrow house. Heat is used from November to April. In the past, the gardens have proved a serious drain on the estate, but, financially, they are now turning the corner and will, it is hoped, eventually be an asset.

Summary In many respects Newby Hall is a typical rural estate. It has had a struggle to keep going, but fortunately has contrived to survive as an efficient and economic unit. In one respect, however, it is worthy of special mention : no outside capital is ever used to reinforce the estate's economy. The capital necessary for maintenance, improvement and development is generated by the estate itself.

Between the landlord and his tenants there is a particularly happy relationship, and many tenants are the third generation of one family to have occupied their farm. As a matter of principle, however, and particularly since the 1947 Act, no joint tenancies are now agreed. Nevertheless, a policy of allowing the efficient son to follow in his father's tenancy still operates.

The Norman French motto of the Compton family, "Je ne cherche que ung," and the management of Newby Hall Estate, show, without doubt, singleness of purpose, both as regards economic self-sufficiency and good estate management.

The writers acknowledge their indebtedness to Major Edward R. F. Compton, Mr. F. G. Apedaile, and Mr. J. C. H. Hawking for their help in the preparation of this article.

WALTER HEAPE AND THE BRITISH STOCKBREEDER

NIGEL HARVEY, M.A., Q.A.L.A.S.

Walter Heape, M.A., of Trinity College, Cambridge, never achieved fame in his lifetime, and is today almost entirely forgotten. He was, nevertheless, one of the first men to grasp and proclaim the agricultural possibilities of that branch of science we now call animal genetics, and in the book which he published in 1906 he foretold much of the future development of farming and the part livestock were to play in it.

WALTER Heape, the biologist, who died in 1929 at the age of 74, would today unhesitatingly be described as "a backroom boy", though he was considerably less specialized than most of his modern successors. In particular, he had spent several years in a business office before he was appointed University Demonstrator in Animal Morphology at Cambridge, where he later became Superintendent of the Marine Biological Laboratory. But he remains an obscure figure whose biography does not appear in any of the more obvious works of reference, and to a later age he is at most a name. Nevertheless, he is worthy of remembrance for a certain remarkable book entitled *The Breeding Industry, its Value to the Country and its Needs*, which he published in 1906.

It was not, apparently, an influential book. It was certainly not a good one. Indeed, as literature it is both irritable and irritating. It is clumsy in style, confused and repetitious in argument, and it exhausts patience with a wearisome attack on the contemporary Board of Agriculture for failing to do many things which it was not designed to do, never intended to do, and which were in any case impossible under the technical and political conditions of the time.

Yet these criticisms are irrelevant to the main issue. Heape was a man with something to say, something which mattered to him intensely, and this alone makes *The Breeding Industry* a valuable book; much should be forgiven him, for he cared much. But it is the character and purpose of the author which give the book its peculiar historical importance. Heape was one of the first of the "professional" scientists, the salaried servants of public institutions, who were so soon to replace the "amateurs" of the older rural tradition; he was one of the first men to grasp and proclaim the agricultural possibilities of that branch of science which we now call animal genetics; and he was also one of the first of his race to speak from the laboratory, as from a pulpit, on the economic implications of scientific discovery. He was, indeed, a doubly prophetic figure. He both foretold many things that came to pass and foreshadowed the growing part which science in its various manifestations was to play in the agricultural system of the twentieth century.

Defeat of a Farming System Nevertheless, *The Breeding Industry* is no detached and timeless treatise, no long-term academic dream. It is a bitterly contemporary book, an agricultural tract for the times, written in an age of depression, crisis and transition. For the previous generation had seen the collapse of the "High Farming" tradition of bread and meat, wheat, roots and fat beasts, which the mid-Victorians had developed from the legacy of the Agricultural Revolution. It was a fine tradition; indeed, in its time it had made our industrial countryside the wonder and envy of the world. But its time was past, for it had been evolved in the days when the home farmer enjoyed a monopoly of the home market, and it could not withstand the overseas competition which prairies and pampas, railways and steamships, mechanical reapers and wire fencing combined to create in the last decades of the nineteenth century. By 1900, the leading article in the *Economist* of 1850, which had referred tritely and casually to the national importance of a good corn harvest, had become an interesting historical document, and Rider Haggard, surveying the stricken fields of East Anglia, summarized with resigned truth the agricultural facts of his own day:

The British nation lives by trade and fills itself with the cheap food produce of foreign countries; the fruit of the fields around its cities is of little weight to it one way or the other. If all England went out of cultivation tomorrow, I doubt if it would make any material difference to the consumer—the necessities of life would still pour in from abroad.

The English farmer's rivals were powerful and he could expect little encouragement and no favours from his countrymen. If he could not produce cheap food others could, and those who delivered the goods won the market. Foreign competition had replaced domestic need as the decisive factor in agricultural development.

Such was the cause of the rural revolution which by the end of the nineteenth century had radically altered both the economic emphasis of the farming system and the face of the countryside. Hence the change from brown to green, as the beaten ploughland went down to grass. Hence a

rapid rise in the importance of the livestock with which the farmer exploited the new pastures that had so suddenly been forced upon him. Hence, too, the development of the liquid milk industry, for the dairyman, unlike the corn-grower, feared no imports. The process is shown at its most lucid in Ojala's classic figures. In the 1860s, he estimates, the British farmer earned some 45 per cent of his gross income from his crops and 55 per cent from his stock. By the early 1900s livestock and livestock products accounting for nearly 75 per cent of his total income. Further, in the same period the proportion contributed by wheat sank from 15 to under 5 per cent, the proportion contributed by milk rose from 15 to 40 per cent.

Yet this drastic adaptation to changed circumstances had been thrust upon the farmer rather than consciously and willingly achieved by him. The old system died hard, sustained long after the financial facts warranted it by the power of custom, accumulated resources and an obstinate pride in an inherently sound way of doing things. Slow, too, in dying were the old traditions. Many farmers recalled nostalgically the sunlit days when King Corn reigned in profitable splendour in the English fields, few found the routine of the cowhouse a satisfying substitute for the more varied operations of the ploughman's year. There are plenty of men alive today who can recall the time when the lowly "teat-puller" who had come to market to buy the squalid necessities of his unfortunate trade hardly dared enter the same public house as the *real* farmers who had come to sell corn and fatstock. But Heape shared none of these prejudices. He saw in the new order of grass and livestock not a mere way of escape from an arable system whose costs and losses had become intolerable, but the basis of a revived agriculture, the source of future recovery and prosperity.

Agricultural Counter-Attack In crude military analogy, the defeat of the High Farming in the 1880s and '90s was absolute; the economic retreat which followed it had been at best a disorderly withdrawal, at worst a rout; and all the efforts of the farming community had done little more than establish a precarious defensive line a long way behind the original front. So much was obvious to any thinking man in the early 1900s, and many farmers had come to accept the changed conditions with a patience akin to despair. It was the virtue of Heape that, in his incoherent fashion, he preached the counter-attack which was to recover for the home farmer much of his lost commercial territory, and predicted the general form it would take, with the green field as its secure base, livestock as its expeditionary force, pure science as its intelligence service, and applied science as its ordnance corps. Few men of the time saw so much so clearly as Heape in his academic backroom.

In his book, Heape assumed without argument that the great days of profitable corn-growing were gone for good, and he quoted with approval the words of Lord Onslow in 1904 that stock-rearing had been "the salvation of many farmers". Indeed, economic pressure and commercial demand ran together to encourage the stockbreeder. The national consumption of meat was increasing steadily: "it is only in comparatively recent years," Heape wrote, "that meat has been regarded by the bulk of men as other than a luxury. Now, however, it is a common article of food". The consumption of butter was also rising. So was the consumption of liquid milk, and though some feared that supply was already exceeding demand, Heape felt rightly that "this trade is in its infancy".

But the exploitation of these new markets depended on the efficiency of the means of production which served them, and the British farmer was

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failing to keep pace with his opportunities. At home, the wealth which had enabled the Victorians and their predecessors to remould their flocks and herds nearer to their economic heart's desire had perished with the farming system which produced it, and the impoverished farming community had few resources and little heart for lengthy, expensive, and perhaps unrewarded, experiments. By Edwardian times, therefore, breeding was largely in the hands of wealthy men who were not dependent on their farms for their livelihood. Thus the best of our stock were bred on non-commercial farms, the bulk of our stock on commercial farms; and the distinction was dangerous. Abroad, other nations were beginning the systematic improvement of their livestock, often using blood from this country in the process, and there was no inherent reason why they should not one day surpass us at the trade in which we were traditionally supreme. But, continued Heape, to all these things there is a possible remedy. Hear what the scientist has to say, bring the biologist on to the farm. The man from the laboratory makes no promises, he offers no hopes of rapid improvement. Nevertheless, in his knowledge may well lie the key to the economic future of farming in this country.

Admittedly, there were in the country many farmers skilled in the *art* of stockbreeding, working with a personal artistry they could seldom explain or transmit. But the *science* of breeding... Well, was there a science of breeding? In 1904, Bateson, speaking at the British Association, had declared that "breeding is the greatest industry to which science has never yet been applied". Heape, speaking as a biologist who "has had occasion to consult breeders continually during the last fifteen years," echoed this verdict with something more than approval and made it the text of the agricultural sermon he was delivering.

A New Science... The first necessity, Heape urged, was research into the laws of heredity and their operation under farm conditions, the second the systematic application of this knowledge to breeding on the farm. Such a combination of science and practice, he continued, could produce beef cattle yielding meat of the right quality at minimum cost. It could produce sheep with good meat, good wool and a tendency to throw healthy twins, this last "a problem of generative physiology which would well repay investigation". It would also produce heavy milking dairy cows and avoid that instinctive bias towards meat which so haunted breeders trained in the old tradition. The "general-purpose cow", incidentally, he condemned out of hand as "physiologically unreasonable", adding that the extra value of her meat in no way compensated for her inefficiency as a milker.

So far the ends. When Heape comes to the means, however, he is painfully and curiously vague. In particular, he makes no reference to Mendel's law, received in this country five years before he wrote, even though at that very time in his own University, only a few hundred yards from where he sat, Biffen was collecting the evidence for the address of 1907 in which he contrasted the haphazard experiments of the older plant breeders with the "modern methods" made possible by the new genetic knowledge. Clearly, Heape had allowed his vision to outrun his facts. But this vagueness did not extend to the implications of his doctrine. Heape had no doubts by what principles or through what authority the science he preached should be developed and applied.

... and its Application The interests concerned are so vast and diverse, he wrote, the matter so subtle, the conditions so varied, the necessary experiments so lengthy and expensive, the need of

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statistics to record general experience so great, that the machinery for such a purpose could not be supplied by any combination of private individuals or societies, neither could the necessary powers be conferred on any body so organized. This, therefore, is the business of the State. Its actual development must depend on individual effort, but no amount of individual effort can supply what is necessary for "a comprehensive understanding of the ever-varying claims and requirements of the industry as a whole", without which no substantial benefits could be initiated or maintained. In practical terms, the Board of Agriculture needed a new "Department of Animal Industry", and Heape devoted a whole chapter to the organization of this hypothetical body, with its Records Section, its Research Section and its staff of investigators and advisory officers. And with this dream of the future, with this appeal unto Caesar, the book ends.

Thus did the forgotten Heape prophesy half a century ago, and few men then or since heard him. Yet, though we must regard his book as a commentary rather than an influence on agricultural development, he was a true prophet, for he saw the trend of his times sufficiently clearly to foretell not only their future course but also the measures which would be needed to control or exploit them. In his implied major premise—the importance of science to agriculture—he was manifestly right; if you want proof of this, look around you. In his particular doctrine—the importance to the breeder of genetical knowledge—he was also right, though he over-estimated the resources which science could offer and the effects these could produce. The modern geneticist provides maps rather than a means of rapid transport, and the layman at least can see little that is automatic in the production of good stock.

In the application of his doctrine, Heape was wrong in fact, right in principle. He showed the administrative necessity of a large organization, but he assumed that this could only be the State. Admittedly, the State has since done many of the things he proposed; but it has done them as paymaster, policeman and patron, rather than as direct executant. No, it is to Thames Ditton, not to Whitehall, that we must look for the fulfilment of this prophecy. For surely it is the Milk Marketing Board, not the modern Ministry, which Heape foretold, and in the impressive annual reports of the Board's Production Division you will see face to face many of the things which Heape saw as in a glass, darkly. The Bureau of Records, the evaluation of progeny tests, National Milk Records, industrial analyses, accounts of veterinary investigations, comparisons of the average yields of milk and butter fat of different breeds; all are there and much else besides.

Above all, these reports summarize, year by year, the development of the artificial insemination movement, which is one of the greatest contemporary factors in livestock improvement: and it is here that the full power of Heape's almost uncanny vision is revealed. For though he does not mention the matter in his book, he was one of the first Englishmen to interest himself in this revolutionary technique, and perhaps the very first to appreciate its agricultural implications. He experimented on rabbits; he superintended the artificial insemination in 1896 of one of Lord Rosebery's blood mares; and the paper he contributed to the Proceedings of the Royal Society in 1897 is one of the documentary classics of this branch of applied science. "The importance of this subject," he wrote in the paper, "is not, I think, fairly recognized, but a fuller knowledge of it will show that it is of great interest to physiologists and of great value to practical breeders." History has more than justified his confidence. Heape may have been a prophet without honour, but he was certainly not a prophet without power.

ECONOMIC PRODUCTION ON A GENERAL FARM IN DORSET

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Technical skill and economic efficiency are combined on this 375-acre mixed farm to give an exceptional high output and a margin for management and capital well above the average for the area.

DEEP in the Hardy country, and quite close to his birthplace at Bockhampton, Dorset, is a farmer practising a system of mixed farming well worthy of the consideration of many of his fellows. The farmer—Mr. C. L. Heard of Ilington Farm, Dorchester—has a holding of 375 acres, most of which is situated on the Reading and Bagshot Beds, and some of it on the alluvium formation. Much of the land is of a hungry, sandy nature, and requires High Farming to keep it in a productive state.

Up to the early 1920s the holding produced summer milk for farm cheese- and butter-making, but for some years before Mr. Heard took over, summer production for the liquid milk market was the main enterprise. Until quite recently the old cheese-room stood as it has done for hundreds of years, but now, with the assistance of improvement grants under the Housing Acts, 1949, the landlord has incorporated the cheese-room into a neighbouring cottage for one of the farm workers, and one more relic of a bygone day has disappeared for ever.

The whey and buttermilk from the cheese- and butter-making were fed to pigs which were housed next to the cheese-room, and the original pigsties have now been brought into full use for the fattening of pigs by modern methods.

It was obvious to Mr. Heard from the start that a plough-and-stock policy was essential if the farm was to be made more productive and profitable. With this end in view, all the available land which could be ploughed and cropped was brought into the rotation, until at the present time some 90 acres of corn (mainly barley), 8 acres of early potatoes followed by kale, 2 acres of mangolds, 1 acre of fodder beet, and 5 acres of marrowstem kale, are grown.

The rotation favoured by Mr. Heard is : corn — corn — roots or potatoes — corn — ley. The ley is kept down for one year or more, depending on the level of fertility and nearness of the field to the farmstead.

Lime deficiency did exist on the farm, but this has been rectified to a large extent, and it is necessary now for lime to be applied only for certain crops.

The arable land, being of a sandy nature, requires constant and unstinting use of fertilizer. To illustrate the amounts of fertilizer used, corn usually gets 2-3 cwt. per acre of a complete fertilizer through a combine drill ; kale receives 10 tons of farmyard manure plus 6 cwt. of complete fertilizer per acre, with nitrogen as a top dressing ; and potatoes have 10 tons of farmyard manure plus 14 cwt. of a No. 1 type fertilizer per acre on land on which sows and litters have been grazed and fed. For the grassland, 5 cwt. of complete

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fertilizer per acre is given to the leys, plus nitrogen as a top dressing for hay, silage or early bite, while permanent grass is dressed with 2 cwt. per acre of complete fertilizer after the first grazing in spring.

This latter practice will puzzle some readers, but when it is explained that the majority of the permanent grass consists of water meadows where the first flush of grass is encouraged by the sole use of water during the winter and spring, it will be clearer.

Early Flush on the Water Meadows The 120 acres of water meadows on the farm were inherited by Mr. Heard when he took over the farm. Under his agreement with the landlord he is bound to maintain all water carriers unobstructed, so that the water will have a free flow. These meadows, like many others adjoining the River Frome, are hundreds of years old, and they provide a source of very early grazing. The normal practice with the water meadows is to clean out the water carriers after harvest in preparation for the first flooding in November. At this time, and indeed at all times, the water is controlled to flood an area for a given period of, say, 3-4 weeks. The watering of the meadows in the past was subject to a plan agreed between neighbouring farmers, and that tradition still exists, so that all meadows alongside the river receive their fair share of water at approximately the right time.

The purpose of watering the meadows, as I have implied, is to promote an early flush of grass without recourse to expensive fertilizers. It seems to be a fact in this area that the farmers with water meadows can turn out their dairy stock to a good feed rather sooner than can their neighbours. Mr. Heard usually puts out his herd in mid-March, with the expectation of an increase in milk output. This year an increase of 25 gallons per day was recorded on sixty cows. Spraying to control the common rush and other weeds, such as buttercup, and the application of fertilizers, are regular features of Mr. Heard's water meadow management.

A Progressive Livestock Policy Hand in hand with the fertilizing and cropping development has gone a livestock policy designed to assist in building up much needed fertility and, more particularly, to reward Mr. Heard for his efforts. The livestock on this general farm is divided into three main groups—pigs, cattle and poultry. The present stocking is : 70 cows, 70 other cattle, 32 sows and litters, 2 boars, 600 hens.

The dairy herd, which is composed of grading-up Friesians, has been established from the nucleus of a herd brought from Warwickshire in 1942. A steady improvement in performance has been recorded since pedigree Friesian bulls were introduced. The first bulls were bought from well-known Dorset breeders, but now a Terling bull from Lord Rayleigh's farms is the chief stock bull. The herd average at the present time is 9,590 lb. in 305 days, and just over half of the milk is produced during the six winter months. The herd is tuberculin tested, attested and dehorned. All cattle are outwintered and the cows are milked by two men in an 8-stall parlour. Mr. Heard aims at producing maintenance and one gallon of milk per cow before feeding concentrates, and he hopes to reduce his reliance on bought foods when the whole of the farm is in full production. A policy of drastic culling of low producers is followed, and these are replaced by heifers reared on the farm.

The breeding of pigs for sale is a most important enterprise on this farm and worthy of some study. Thirty-two Wessex Saddleback sows and gilts

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are kept for breeding purposes. The sows from which the future herd replacements are expected are mated to a pure-bred Wessex boar; the others are crossed with a Large White boar. The sows are kept out of doors the whole time, and Mr. Heard aims at farrowing them down during March and September. They are housed individually in semi-circular galvanized iron huts, which were built by farm labour.

The practice of allowing the sows plenty of exercise and green food, coupled with the good strain on the farm, are the main factors contributing to the fine record achieved. The high litter average of just over 20 pigs per sow per year is a consistent feature of the whole pig enterprise. The sows are maintained in good condition on leys or stubbles, and to economize in labour, "nuts" are fed to the sows before and after farrowing. Notwithstanding the fact that the piglets have access to a creep at an early age (3 weeks), the milking propensities of the sows are self-evident in the weight of the pigs at weaning time (8 weeks). This averages 40-45 lb. for all litters, and a reputation for economic food utilization is emphasized by the demand for store pigs from this farm in local markets, and, indeed, throughout the county.

The management of the pigs on the grassland in summer and on the stubble in autumn and winter involves the use of an electric fencer unit, which allows the young pigs free range, whilst confining the sows to a limited area. Drinking bowls have been installed on the land where the pigs are grazed, and Mr. Heard believes that success in pig-keeping is largely dependent upon the pigs having adequate land on which to graze—land which is in a good state of fertility and capable of growing good quality feed for the pigs. In addition, there must be adequate food in the form of concentrates, a plentiful supply of water, and the right type of stock must be kept. In other words, good, sound pig management is necessary from the very beginning. The young pigs are normally sold at weaning time, but if the market happens to be depressed, the pigs are then taken through to grading: and under the new system of grading, Mr. Heard is getting 88½ per cent Grade A pigs.

Marked Degree of Economic Efficiency The technical skill evident on this farm is associated with a marked degree of economic efficiency. The data in Table 1 reveal an output of £50 18s. per acre, which is over £20 more than the average for a group of comparable farms in the county. The dairy and pig enterprises together account for nearly three-quarters of this, with cash crops, poultry and eggs occupying relatively unimportant positions in comparison. The annual herd average of nearly 900 gallons of milk per cow was achieved without resorting to purchased animals, and Mr. Heard is now in a position to sell a high proportion of in-calf heifers, since the turnover of his herd is relatively low and he needs only a few animals each year for replacement.

The pig enterprise contributes over 28 per cent of the total output and is sufficiently important to warrant some attention. The summary of costs given in Table 2 shows that for every £100 of production, £38 was available as a return for management and capital invested in the enterprise. This figure is considerably higher than the results of economic investigations carried out by some Provincial Agricultural Economics centres.

The superior position of the pig enterprise on this farm is in large measure due to the economies achieved in feeding. The sows are out of doors all the year round and have, in fact, assisted in bringing the hungry sandy soil on parts of the farm into a reasonable state of fertility for seeding out to appro-



Friesian heifers on a ley made from reclaimed land.

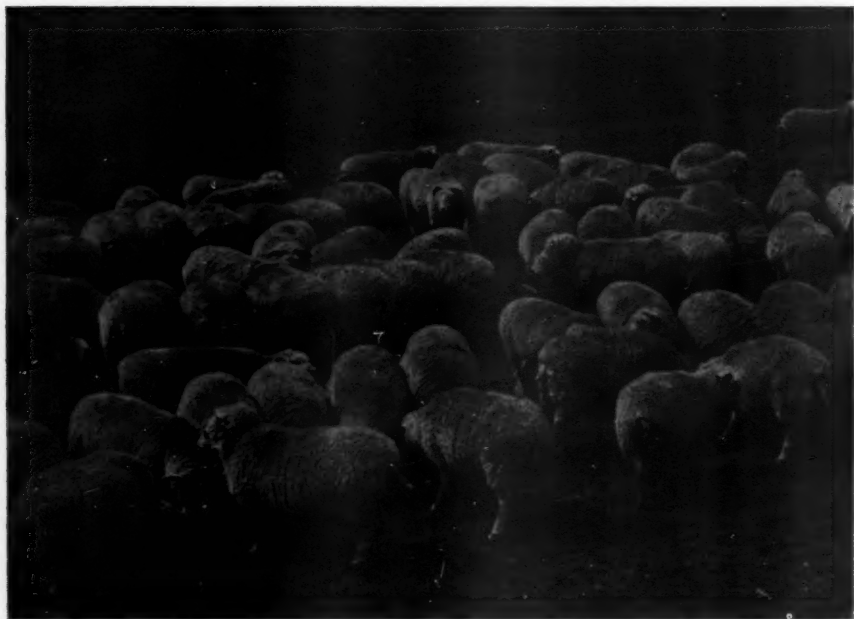


Photos: *Commercial Camera Craft*

Thirty-two Wessex Saddleback sows and gilts are kept for breeding.



Pedigree Dorset Horns at Stinsford Farm.



Photos: *Commercial Camera Craft*

Trough food is supplied almost entirely from home-grown sources.



Selecting for market.



Photos: Commercial Camera Craft

Surplus sheep are sold at the annual May Fair in Dorchester.

MARKETING SPRING CABBAGE (Article on pp. 394-7)



Top : Correct cutting of cabbage, leaving the surplus leaves for ploughing-in.

Centre : Packing a bushel box. Twelve cabbages are packed on a bottom layer of six.

Bottom : Two other methods of packing the bottom layer of a bushel box.

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priate grass mixtures. The other outstanding feature is the fact that the sows are very prolific, giving an average of 10.4 pigs weaned per litter; the gilts are almost as good with 9 pigs per litter. Mr. Heard has managed to breed a pig giving a good food conversion rate and capable of producing high litter averages, and it is not surprising to find that there is a very keen demand for weaners from his herd.

Table 1
Output per Acre

Output :	Farm £	Group Average £
Crops	7.2	7.1
Cattle	4.2	3.0
Dairy produce	23.8	12.8
Sheep and wool	—	2.7
Pigs	14.4	1.4
Poultry and eggs	0.5	1.6
Sundries	0.8	1.4
Total output	50.9	30.0
Food and seeds purchased	14.5	5.0
Net Output	36.4	25.0

Table 2
Summary of Costs per £100 Output in Pigs

	Farm £	Average* £
Food	52	72
Labour	8	8
Depreciation	2	4
Total Costs	62	84
Management and Investment Income	38	16
Total	100	100

* Average for Cambridge and Leeds

This high production (intensity of land use) has not been achieved without incurring a high level of expenditure. Mr. Heard has not been afraid to buy foods which, together with seeds, cost £14 10s. per acre—a figure considerably above the average of the group. But even with this high expenditure, the net output of this farm is still much better than average. The high costs are not restricted to feeds: the labour bill on this farm is also very high, but the farm organization provides an adequate volume of work, and the analysis reveals an efficient utilization of labour. The output per £100 of labour is £530, compared with a £415 group average. This satisfactory position is due to good labour relations, efficient cowshed routine, and a judicious use of implements and machinery. The manure bill amounts to £4 per acre, compared with a £2 2s. average, but these heavy dressings are amply justified by the number of animals which Mr. Heard carries on the farm, after making due allowance for bought food.

The position on this farm then is one of high output and high expenditure. At a time when the emphasis is on reduction of unit product costs, it is necessary to establish whether this high level of expenditure is justified. In the last resort, the farmer alone can tell if the return he receives is adequate for the outlay of time and money. The net income he derives from the farm

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must be sufficient to recompense him fully for the manual and management tasks performed, as well as to provide him with a sufficiently high return on the capital invested in the business. In this particular case, it would appear that the policy of high production and high expenditure has been amply justified, for on the basis of both net income and management and investment income, Mr. Heard succeeded in obtaining much better results than the group average.

In conclusion, we should like to record our appreciation to Mr. Heard for his ready co-operation in all our work, more particularly as it applies to this fundamental subject of farm management. Our thanks are due to him for his willing and helpful advice and for allowing us to publish particulars of his farm business, for, by so doing, his experiences in management are made available to other farmers operating under similar conditions.

AGRICULTURAL STATISTICS : ENGLAND AND WALES

GLASSHOUSES (a) (January 1954)

	January 1953	January 1954
TOTAL AREA OF GLASSHOUSES	<i>acres</i>	<i>acres</i>
With heating apparatus	3,935	3,928
Without heating apparatus	674	708
TOTAL	4,609	4,636
CROPS IN GLASSHOUSES AT JANUARY 15		
Lettuce	470	520
French beans	4	3
Mushrooms	40	38
Other vegetables and herbs	74	62
Carnations	156	160
Roses	93	97
Orchids	10	10
All other flower and foliage crops	671	592
All other crops not specified above	403	422
Remaining glasshouse area (being the area unused at January 15, or used for other purposes not shown above)	2,688	2,732
TOTAL	4,609	4,636
CHRYSANTHEMUMS IN GLASSHOUSES		
Area of chrysanthemums grown in autumn and winter	739	794
LETTUCE IN GLASSHOUSES		
Area of lettuce completely cleared before January 15	80	76
Area of lettuce as at January 15	470	520
Area of lettuce to be planted between January 16 and March 31	336	336

(a) The holdings included in this census are those with 1,000 square feet or more of glass.

GLASS SECTIONAL FRAMES

W. E. SHEWELL-COOPER, M.B.E., N.D.H., F.L.S., DIP. HORT.(WYE)

Principal, The Horticultural Training Centre, Thaxted

Mr. Shewell-Cooper claims that glass sectional frames have many advantages over the older Dutch lights and cloches. They may be used for a wide variety of crops and, by careful planning, can be fully and profitably utilized all the year round.

THE commercial growing of fruit, vegetables and flowers under unheated glass is a relatively new practice in English horticulture, but the introduction of the Dutch light over here gave it a decided fillip. In due course the cloche was introduced, and when during the war the shortage of timber restricted the manufacture of Dutch lights, the number of cloches in use increased greatly. Now, since the war, a third type of unheated glass—the flat-topped cloche or sectional frame—has made its appearance. The first product of this type came on the market in 1946, but the way in which it has established itself in the favour of growers since then has been remarkable.

What features does the glass sectional frame offer to justify its introduction to a public already able to buy either Dutch lights or cloches? Perhaps its greatest advantage over the Dutch light is the amount of manual labour which it saves. A Dutch light, for instance, sheds all the rain which falls on it, so that every drop of water required by the plants has to be applied by hand; and, moreover, the lights themselves have to be lifted to do this. Dutch lights also shut out air, and consequently what air is needed by the crop has to be admitted by hand ventilation. Again, Dutch lights are heavy to handle, and if there is a breakage, a large and expensive piece of glass has to be replaced. And they do tend to "draw" plants, because the only source of light is through the top of the frame.

In comparison, the flat-topped sectional frame accepts all the rain which falls on it—the top consists of panes of 24 inch \times 18 inch glass, and the rain drains off the edges of these squares on to the bed beneath. Only when there is insufficient rain is watering necessary, and even then it can be applied to the apparently "closed" frames and will drain inside. Thus any form of watering, including spray-line irrigation, can be practised. With regard to ventilation, the sectional frame is so designed as to provide a constant supply of fresh air automatically. The air is not only fresh, but it is also naturally moist, because the rain or irrigation moistens the soil surface within, the play of the sun through the glass leads to evaporation, and thus the air within the frame is kept at a natural humidity, instead of becoming dry. This is a very important point.

The assembly and stripping of sectional frames is relatively easy, as the heaviest component is the 24 inch \times 18 inch glass. In consequence, they are not difficult to move when any work has to be done on growing plants during the season. When breakage does occur (and this is seldom) replacement is considerably cheaper. Finally, since light enters the sectional frame through top, sides and ends, the plant keeps its natural shape and is not drawn at all.

The ordinary type of cloche, like a Dutch light, has a number of disadvantages compared with a sectional frame. It, too, sheds all the rain that falls on it. Further, modern cloches have special wiring for use with ventilating practices, so that most of the glass is held under high tension. This increases the danger of breakages partly because glass under

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tension will break between the tension points much more easily than glass which is not at tension, and partly because natural circumstances, such as a freeze-up followed by a thaw, can result in the glass expanding quicker than the metal which grips it. In comparison, some at least of the sectional frames are so designed that *none* of the glass is at tension. The sectional frame is also so much more streamlined than its competitor that it is more or less gale-proof: indeed, some types are actually guaranteed by their makers against damage by gales!

Summing up, then, sectional frames give ample protection from wind and frost, provide soil freshness (because for each crop they can be established over rested ground), soil warmth and moisture, air freshness, warmth and moisture, and adequate light—which is, after all, an ideal set of growing conditions. They are simple to erect and strip, and permit of growing crops in a solid block, which is much more practicable than in separated strips.

Continuous Cropping We have used these flat-topped cloches to cover many crops; for example, among fruit and flowers, strawberries and melons, anemones, asters, calendula, chrysanthemums, daffodils, gladioli, iris, polyanthus, sweet peas, violets and zinnias. The range of vegetables has been even more extensive; namely, asparagus, beans (broad, dwarf and runner), early beet, brassica seedlings, early carrots, cauliflowers, celery, cucumbers, lettuce, (Christmas and spring), marrows, peas, radish, sweet corn and tomatoes. The routine is first to decide upon a rotation. Let me take a typical example. We specialize in strawberries: thus we have glass over August-planted maiden runners from February to the end of May, leaving the frames available for other uses from June to the end of January. To complete the rotation, we usually choose to grow melons, covering them from June to September, and then Christmas lettuce, covering them from October to January.

To achieve this succession with the least amount of work, the lettuces and maiden strawberry runners are planted in adjacent plots in August. When the lettuces have been cleared and the frames transferred to the strawberries in February, the original lettuce block is cleaned and cultivated and melon beds are prepared there. This is done as early as possible to allow time for two or three shallow hoeings to disturb the surface soil and destroy weed seedlings before planting out. The melon seeds are sown in April in a warm house and the plants are put out on the prepared plot in June, just as the frames are being removed from the strawberries. The new lettuce plot, which will start the second year's rotation in August, can then be prepared on the original strawberry bed.

It will be seen from this that not only are the frames in continuous use over the whole twelve months, but they have grown three crops—lettuce, strawberries and melons—each on clean, thoroughly cultivated soil. And if the crops are well grown (and we like to think ours are), the frames will more than justify their cost in this one year!

Profitable Yields What returns can a commercial grower expect from these frames? I have heard of one lettuce crop grown under the frames, which in the spring of 1953 yielded over 15,000 head, fetching, on average, 10½d. each in Covent Garden market. I have heard, too, of several strawberry crops which amounted to over 13 oz. per plant, the highest being 1 lb. per plant; and this at a time when many growers were securing

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over 5s. a lb. for their strawberries. Many melon growers have also secured more than three melons per plant, and sold them easily at 2s. 6d. and upwards each.

Using figures based on these yields, we can easily calculate the returns that the frames would give over a year. Suppose the unit of frames concerned was 600 feet of a model 18 inches high and 45 inches wide. The total cost now would be around £180, and it would be enough to set up six rows each 100 feet long. This arrangement, with paths, would cover about one-ninth of an acre, but in actual fact one-third of an acre in all would have to be allocated to the crops to be covered. The area should then be divided into three parts. One will be sown in August with Christmas lettuce; these will be thinned out in October (or planted out, as the case may be) and covered with the frames from then until January. The second plot will also be planted in August with maiden strawberry runners and will be covered with the frames from February until the end of May. After this, the only protection needed will be against birds, etc., and this can be provided by netting. The third plot will be planted out with melons at the beginning of June, and will be covered by the frames from June to September.

The lettuce, at four rows to the bed, 8 inches apart in the rows, would nominally produce 3,600 head. Suppose the average price obtained was as low as 4d. each and the number marketed was 3,400: the gross takings would be just over £56 10s. The strawberries, at four rows to the bed, 1 foot apart in the rows, would mean 2,400 plants, and, with a yield of just under $\frac{1}{2}$ lb. per plant, about 1,160 lb. would be available for market. At an average price of 4s. a lb., the gross takings would amount to £232. The melons, at one row to the bed, 18 inches apart in the rows, would mean a total of 400 plants. Allowing for slightly over two melons per plant being marketed, the crop, at 2s. 6d. a melon, would yield, say, £105. The market income from these three crops would thus be £393 10s. And this is being modest about yields and prices!

Some Crop Results Turning from estimates to actual crop results, it is worth recalling that one of the earliest users of these frames was a market garden in Kent. Back in 1946 they sowed sweet peas under them and in December they interplanted with lettuce. In the following January came the biggest freeze-up that we have known in our lifetime in this country, and in February these crops were written off, for the frames were by then just heaps of frozen snow. But in late March, when the thaw eventually came, the growers were amazed to see the crops still alive. The lettuce were duly marketed and the sweet peas were so successful that the market returns paid for seed and work, covered the whole cost of the frames, and still left a margin beyond that!

This market garden has been using the sectional frames ever since and now has very much more than the original 600 feet of double-span frames. The owners have very kindly given me the following figures, which cover the use of 600 feet of 18-inch flat-topped cloches from October 1952 to July 1953. From October to March the frames were over pansies, bellis and polyanthus, which were being raised as bedding plants. A 200-foot run of frames over pansies produced an income of £26 8s. 11d., while a similar run over bellis brought in £86. Then from March 25 to April 20 the entire 600 feet was placed over gladioli, which, when marketed, yielded £97 10s. From April 20 to the end of July the run was split equally between sweet corn and marrows, the sweet corn selling for £26 8s. and the marrows for £28 5s. 6d. Thus the total value

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of the yield from the 600 feet over a period of only nine months amounted to no less than £238 3s. 6d. It should be pointed out that this nursery has no retail trade and that all these prices are therefore growers' market prices.

I have no doubt from these results that sectional frames, or flat-topped cloches, as I generally call them, have come to stay, and I look forward to carrying out further experiments with them to prove, if further proof be needed, that they are one of the most profitable forms of cold glass on the market today.

MARKETING SPRING CABBAGE

A SURVEY OF PRACTICES

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Spring cabbage is a speculative crop, and this fact militates to some extent against standard packing and grading for market. Nevertheless, a recent survey suggests that there is much scope for improvement in cutting, handling and packing methods.

IN the course of field studies into the practical value of the national "Recommended" grades for cabbage greens and cabbage, a considerable number of growers in the main production areas have been visited during the past few seasons. The observations made serve to show how little standardization there is in the products as marketed and how varied are the methods of harvesting, preparing and packing spring cabbage greens and spring cabbage. Such differences in practice contribute to lack of uniformity in the produce marketed. Some of the methods are associated with climate and other factors that make for earliness; thus Devon, Cornish and Evesham "spring cabbage" is frequently marketed as "greens", whereas the same product from later districts tends to be marketed as "hearted cabbage". An overriding influence, however, is the fact that often a spring cabbage crop is marketed when it is expected to offer the best cash return and not, as with many crops, when it has attained a certain stage of maturity. When a crop of spring cabbage is drilled or planted, the grower is often uncertain whether it will be marketed unhearted as "greens" (weighing anything from a few ounces up to about 1 lb. each), or as hearted cabbage (1-3 lb. each).

Spring cabbage is a highly speculative crop, because of the large part the weather plays in determining the availability of winter and spring greenstuff generally. When greenstuffs are short, spring greens or cabbages make high prices, and almost any quality will sell readily: when greenstuffs are plentiful, marketing costs may not be covered. Both these circumstances discourage the use of standard grades and packs, and, in fact, grading for uniformity in size and quality was not practised by most of the growers visited. Nevertheless, some of them regularly grade "hearted" spring cabbage, and the fact that they continue to do so year after year is evidence that there is some demand for the graded product.

Although the deliberate grading of spring greens was not attempted by any of the growers, many do produce high quality greens packed to full

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weights, thus achieving two of the most important and desirable requirements in marketing. Our inquiries suggest that by "selective cutting" (which is dealt with later), care in handling and packing, and the use and proper filling of suitable containers, growers who at present do not adopt these methods could enhance their market reputations and do a great deal to improve the demand for spring greens and cabbages, which at their best are grand vegetables, but at their worst are most unattractive.

Varieties and Harvesting Methods Most growers have a preference for a particular variety, and most varieties consist of a number of strains, many of which have been selected by the growers themselves. Strains of Early Offenham predominated among the growers visited, but also represented were strains of Durham Early, Rous Lench, Early Market, and Flower of Spring. The outstanding characteristics of a good strain of spring cabbage are hardiness and earliness—that is, at an early stage the leaves begin to turn in and the plant presents a bold and attractive appearance. Both earliness and size are affected substantially by manuring practices.

To facilitate harvesting, it is general practice to cut service tracks, so that each part of the field can be reached by cart or tractor. The "track-ways" frequently consist of drilled spring cabbage intended for cutting as "greens" before the rest of the crops.

There are two ways of clearing the crops, although one applies mainly to greens or mixed greens and cabbage, and the other to cabbage alone. One method, which is favoured particularly in Worcestershire, Lincolnshire and Devonshire, is to clear the crop, block by block, in one operation. Where this method is used, the bulk of the produce at the beginning of the season consists of greens, but later a proportion of hearted cabbage will be present. There is, therefore, a seasonal trend from greens towards cabbage. Crops harvested in this way, however, lack uniformity in size—a fault which becomes more marked as the season advances.

In the second method of harvesting, the cabbages are cut selectively—that is, only cabbages that have attained a similar stage of maturity are cut at one time. This is the general practice in Kent, Bedfordshire, the Thames Valley, and in the later districts. In this type of harvesting the "cutters" walk between a pair of rows (or more if the proportion of hearted cabbage is low), cutting only cabbages at the right stage of maturity. Anything over-mature or otherwise defective is slashed to save time in succeeding cuts.

Generally speaking, cabbages cut by either method are placed into heaps or windrows, although some growers who cut by the block pack the produce direct into the market containers, so avoiding additional handling and preventing the soiling that may occur when cabbages are heaped. As cabbages and greens soon lose quality and weight if left exposed to wind and sun, it is usual for "packers" to follow closely on the "cutters". Where only a small number of people are employed, cutting and packing may be done turn and turn about.

A number of different tools, such as cobblers' and "lino" knives, light choppers made from old scythe blades, beet knives and straight-bladed choppers, are used for the actual cutting of greens and cabbage. Generally, the most satisfactory work is done with a knife, for with it a clean cut can be made at a point that makes trimming unnecessary. A chopping action is less precise and may lead to bruising or splitting the stem towards the heart. Further trimming may then be necessary. Given a well-sharpened knife, the

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proper cut can be made after grasping the heart of the cabbage with one hand, selecting the correct leaf joint, and making a thrusting diagonal movement with the knife across the stem immediately below the joint. Nearly the whole of the knife blade is used : indeed, on very large or tough cabbage a chopping tool may be needed.

Packs and Containers At the present time all the containers used in marketing spring greens and cabbage are returnables. The packs made differ according to the type of container used. In several areas, particularly those serving the London markets, the returnable bushel (20 inches \times 13 $\frac{1}{2}$ inches \times 10 inches, internal dimensions) is the chief wooden package favoured. It is not very satisfactory for hearted cabbage, for which it is mainly used, because it holds too few in relation to its weight and cost. Usually there are two layers in the pack, the bottom layer either being laid flat with the butts towards the sides, or on the incline with the butts towards one end. The top layer is packed butts upward. Twelve cabbages of above medium size more than fill the bushel box, and when the pack extends beyond the top of the box the filled boxes must be stacked on their sides. The cabbages in this container are not tied down, and therefore a very tight pack must be made to prevent them from falling out.

In the Evesham area and, to some extent, in Devon, cabbage greens and cabbage are packed in the "pot" crate (19 $\frac{1}{2}$ inches \times 14 inches \times 12 inches). This slatted wooden crate has displaced the traditional brown willow "pot". The usual practice is to pack 40-50 lb. in the pot, but to obtain these weights almost as much cabbage must be packed outside as in the crate. The cabbages are built up into a ridge, those at the top being protected by a little straw or hay, and secured with string, which is laced under the upper side slats of the crate. In spite of the straw, the string, which of necessity must be tight, often damages the cabbages. The largest cabbages or greens ("toppers") are used to build the ridge, and because of this an Evesham pack consists of small greens at the bottom and large greens or cabbage at the top. The completed pack is stacked on its side.

In Cornwall and some parts of Devon the "Roscoff-type" broccoli crate* is used for packing spring cabbage. It is particularly good for graded, well-hearted cabbage packed in 24s, 30s or 36s. A well-packed broccoli crate should hold 40-48 lb. of cabbage.

A crate with internal dimensions of 22 $\frac{1}{2}$ inches \times 15 inches \times 13 $\frac{1}{2}$ inches is used to some extent in Lincolnshire. It is a good package for graded hearted cabbage, because weights of around 54 lb. can be packed with all the cabbages within the crate.

The "half-bag" is used largely for marketing spring greens and spring cabbage in Lincolnshire and Kent, and, to a less extent, in Bedfordshire. The half-bag may be packed to hold from 30 to 40 lb. of cabbage or greens, about 36 lb. being the most usual weight. Occasionally, potato sacks, which hold about 56 lb. of cabbage, are used. Before packing, the bags are rolled down to at least three-quarters of their length. Greens are then thrust in by the handful. When packing hearted cabbage in the half-bag, two cabbages are first placed in the corners with their butts towards the outside of the bag, and succeeding cabbages are placed in pairs at right angles to those immediately below and always butts outwards. The pack is completed with a number of cabbage packed with their butts upwards, and the bag is closed by lacing

* The new B.S.I. dimensions for this package are 22 inches \times 14 $\frac{1}{2}$ inches \times 13 $\frac{1}{2}$ inches.

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with string. The life of a bag is prolonged if tagged ties are used, since the tag passes through the weave without damaging it.

It is not usual to pack spring cabbage to checked fixed weights or to declare a net weight. Although platform scales are frequently available, their purpose is to make an occasional check if any bags appear to be "light" or over-packed. It is claimed that skilled packers can usually judge the desired weight fairly accurately. Similarly, crates are rarely packed to pre-determined counts, and a lot may contain anything from 12 to 18 cabbages. Nevertheless, a few of the growers visited do pack to definite counts and sell the produce on that basis.

It is almost impossible, of course, to determine a net weight for cabbage within the degrees of accuracy that are possible in, for example, a food factory. The containers may vary in weight quite considerably when dry, and even more when wet or soiled by earth. Furthermore, after rain or snow cabbages weigh more than when they are dry. An obviously "full" pack in a standard container is the general objective.

Variations in Amount of Labour Used During this survey information was collected about the manpower used in harvesting and packing cabbages. Because of the differing nature of the records and information, accurate comparisons were impossible; it is clear, however, that the amount of manpower used varies widely. Thus the number of bushel boxes cut and packed per man-hour varied from 8 to 21. The highest figure gave a poor pack, whereas a good job was done where, in one case, an average of 15.8 boxes were cut and packed per man-hour. The low figure of 8 boxes per man-hour included loading time. Cutting of the cabbage and packing into half-bags gave figures of between 5.4 (including loading time) and 20 per man-hour. The cutting, packing and stringing of pot crates ranged from 9 to 12.5 per hour. The highest demand for labour was in one instance where pot crates were used with lids. Here cutting, packing and weighing resulted in an output of only 3.3 crates per man-hour. An attempt was made to compare output when the crop was cleared and packed in half-bags, with that when it was cut selectively and packed in bushel boxes. The figures, for what they are worth, were 12.2 half-bags and 14.3 bushel boxes per man-hour.

The variations found in the man-hour figures suggest the need for more systematic investigation, coupled with time-and-motion studies of the different methods. Further study is also necessary to decide which methods, packages and packs give the best results, with particular reference to the economic aspect.

STUD GOAT SCHEME, 1954-55

The British Goat Society has recently published its list of goats accepted under the Stud Goat Scheme for 1954-55. The Scheme aims at improving, by selective breeding, the productive quality of milch goats kept by smallholders, cottagers and others of similar position. It is administered by the British Goat Society under the approval of, and with financial assistance from, the Ministry of Agriculture and Fisheries. The fee charged for each service must not exceed 7s. 6d.

Copies of the list may be obtained free from the Secretary of the British Goat Society, Diss, Norfolk.

THE CATTLE OF BRITAIN

15. DAIRY SHORTHORN

THE history of Dairy Shorthorns really begins with Thomas Bates of Kirklevington, who early in the nineteenth century carried on the work of improving the Shorthorn breed begun by the Colling brothers. While the Booths took the breed along the road which led ultimately to the Beef Shorthorn, Bates, who looked ahead to the demand for liquid milk caused by the growing urban population, was breeding "for the pail". Not only that, he was working for milk at lower cost, considering that the true test of excellence was a comparison between the food which an animal ate and the improvement it made. At a time when the principles of genetic laws were still largely unknown, he worked by measurement, recording, observation and comparison.

Like all pioneers, he found others slow to follow his lead. Although his remark "I shall never live to see the day when my stock will be duly appreciated," was not quite true, he did not survive to see the full triumphs of his animals. At the sale of his herd soon after his death in 1849 (admittedly a time of agricultural depression) the stock averaged only £67 per head. But twenty-four years later a sale of Bates-bred cattle at New York Mills brought an average of £734 each for 109 head, and the fifteen animals of the "Duchess" family averaged £3,769 each, two of them fetching 7,000 guineas and 8,000 guineas respectively. And these prices were paid by English buyers!

The craze for Bates's blood became the undoing of the breed, for the inbreeding which had been so successful in the skilled hands of the early masters began to be carried to such lengths in the interests of "paper pedigrees" that the cattle were in danger of losing constitution and other desirable qualities. But a *renaissance* began under the wise leadership of breeders such as George Taylor of Cranford and Lord Rothschild of Tring, who infused into the Bates's strains the blood of some of the best of the Booth- and Cruickshank-bred animals.

Then, in 1905, came the formation of the Dairy Shorthorn Association, which offered prizes for cows with dairy qualities, published records, and virtually made the Dairy Shorthorn breed. It issued the Dairy Shorthorn Year Book, and in 1918 instituted a Grading-up Register. In 1936 the Association amalgamated with the Shorthorn Society, which had been formed in 1875.

In colour, the Dairy Shorthorn ranges from dark red and red and white, through all shades of roan to pure white. It has a broad and level back with strong loin and wide hips, a deep barrel with well-sprung ribs and a broad chest. The skin is flexible and mellow to the touch, and the horns should not be dark.

Thomas Bates's aim for better food conversion has been the objective of successive generations of breeders, and the Dairy Shorthorn of today has the ability to thrive on a minimum of concentrates. Because it fits easily into the mixed farming system, giving good yields without special fuss or elaborate feeding, it has become the universal "farmer's cow". Its hardness makes it suitable for outwintering and it will do as well on the hills as in the valleys, while its adaptability to hotter climates has taken it to many tropical countries.

The breeding of milk into an animal with beefing qualities has resulted in a true dual-purpose type, which can give from 8,000 to 10,000 lb. of high

quality milk and provide excellent beef steers. This is a valuable characteristic at a time when the demand for meat produced at an economic price is likely to be greater than the need for more milk.

The Dairy Shorthorn's beefing qualities have been shown by its performance at recent Smithfield shows. The fifteen Dairy Shorthorn steers at the 1953 Smithfield averaged 12 cwt. at just over 2 years—an average daily liveweight gain of 1.86 lb. These steers were from dams which averaged 8,961 lb. milk at 3.48 per cent butter fat, and their sires' dams averaged 11,797 lb. at 3.73 per cent.

Proof that the breed is continually improving its milk yields is shown by the fact that the 305-day lactation record for Dairy Shorthorns in the United Kingdom has recently been broken twice within a few months. In November 1953 "Clanville Lady Butterfly 8th" broke the then existing record with 25,415½ lb. in 299 days. In March 1954 this was exceeded by "Boxgrove Barbara 4th" with 26,704½ lb. in 305 days. This cow's 1,218 lb. of butter fat in the same period was also a breed record. Both these cows have exceeded a lifetime yield of 100,000 lb. with their sixth calves.

At the 1953 London Dairy Show a Dairy Shorthorn cow, "Cleatlam Nellie 22nd", was reserve for the Supreme Championship and the Buckhurst Cup, both inter-breed contests. The Dairy Shorthorn team came first on inspection for the Bledisloe Trophy. A more recent triumph was achieved at the Royal Show at Windsor, where Shorthorns won both the Burke Trophies.

The constitution of the Dairy Shorthorn enables her to give good quantities of milk over a long and regular breeding life. Nearly 500 cows of the breed are known to have given a lifetime yield of 100,000 lb. and over, among them "Winton Gentle 2nd", which gave a total of 223,917 lb. with fifteen calves. "Dorothy", winner of the 1952 inter-breed Harold Jackson Trophy for milk and butter fat over three successive years, has a lifetime yield of 176,031 lb. with ten calves, and in the first thirty days of her eleventh lactation gave 1,827 lb.

Among factors which have helped to promote more milk in the Dairy Shorthorn have been the institution of schemes to enable breeders to trace the most valuable animals. The Improved Register of Merit for bulls, established in 1944, contains a list of 285 sires whose daughters have reached specified qualifying yields at certain ages. The Advanced Register for females, started in 1947, provides a record of about 1,500 cows which have given a minimum of 10,000 lb. milk after calving at four years old. Last year the Shorthorn Society issued a Bull Progeny list, giving progeny records of more than 1,700 Dairy Shorthorn bulls born since 1940 which have a minimum of ten recorded first-calf daughters. A second list will shortly be ready.

This year the Society celebrates the publication of the hundredth volume of its Herd Book. The first volume appeared in 1822, but early issues each covered several years' births. This year's volume will contain the records of 4,198 bulls and 19,122 females born in 1953. The Herd Book, still named "Coates's Herd Book" after its first editor, records both Beef and Dairy Shorthorns. The Shorthorn Society, which promotes the interests of both sides of the breed, has a membership of over 6,300.

A. Furneaux,
Secretary,

Shorthorn Society of the United Kingdom

16. NORTHERN DAIRY SHORTHORN

THE dales-type Dairy Shorthorn is probably one of the oldest breeds of cattle in Great Britain. It has been resident in the hills and dales of northern England for many generations: some members of the Society have female strains which have been in the possession of their families for over 100 years.

The Shorthorn originated in the north-east of England and was developed by North Country breeders, but from this small area it has spread all over the world, although even to this day it is known in some countries as the "Tees-water" or the "Durham". There is evidence of cattle breeding in the Teesdale area, where attention was given to improved breeding, between 1700 and 1750. From this nucleus the Shorthorn was improved even before the time of the Colling brothers, who, having a clear aim in view, selected a number of the best specimens and applied the principles of breeding introduced by Bakewell. It is quite evident that in the northern dales, where farming customs are slow to change, the breed or type of Shorthorns resident there today are direct descendants of the Shorthorns of the early days. Although never registered, they have been kept pure for type by the close interchange of dales Shorthorns between neighbouring dales, such as Teesdale, Swaledale, Wensleydale, Weardale, Allendale, and it may be, if pedigrees could be traced, that they would have some of the oldest of any breed of cattle.

At the start of the Second World War the production of milk became a top priority and some breeders, tempted by economic circumstances, started crossing their dales Shorthorns with bulls of pure dairy breeds. Owing to high vigour many high yields were obtained in the first generation of such crosses, and the practice of cross-breeding spread. Several dales Shorthorn breeders of long standing saw the danger of the dales-type Shorthorn losing its identity, and their enthusiasm for this fine old breed impelled them to form a society for the express purpose of keeping the breed pure.

It seemed a case of history repeating itself to find Teesdale breeders again to the fore in the formation of the new Society, and like their forebears of 200 years ago their interest in the Northern Dairy Shorthorn soon found large numbers of supporters in the original Shorthorn area of Teesdale.

Over the Pennine Range in the Kirby Stephen district of Westmorland other enthusiasts were at work, and after two private meetings, the first public meeting was held in the Auction Mart at Penrith in Cumberland on January 6, 1944. Dales Shorthorn breeders from Cumberland, Westmorland, Durham and Yorkshire were present in force and a decision to form a society was taken.

The Chairman elected at this meeting was Mr. George Dent of Nateby, Kirby Stephen, who moved the official resolution that a society should be formed, pointed out that they were considering a class of cattle that had been bred in the hills and dales for generations, and had stood the test of years. Mr. Norman Field of Lartington Hall, Barnard Castle, who led a considerable number of Teesdale breeders, seconded the resolution, which was carried with great enthusiasm. Thus a new breed society was born to shape the destiny of this fine old breed.

The first volume of the Herd Book of dales-type Shorthorns was published in 1944. Herd Books have been published each year since, and at the end of 1950 the Book was closed to the entry of animals on inspection, and from then onwards the only entries accepted have been progeny whose pedigrees

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can be traced to the foundation stock in the early volumes. The pioneers have, therefore, achieved their object of preserving the breed by means of registration in the Herd Book.

From the start of the Society the emphasis has been on greater care in the selection of the bull, and members have been encouraged to build up pedigrees, not just as a collection of names of ancestors, but to form good pedigrees of males and females proven for the transmission of essential qualities. To help members, extended pedigree catalogues are used at all official shows and sales, so that the transmission value can be judged.

Progeny heifer and herd competitions are held each year to enable the Society to spot proven Northern Dairy Shorthorn sires. The Society also entered into an arrangement with the Milk Marketing Board in 1954 for the transmission of all pedigree Northern Dairy Shorthorn bulls with ten or more daughters in milk to be reported to the Society. These are the lines of improvement on which the Society will go forward from generation to generation.

The type and conformation of the Northern Dairy Shorthorn is already famous, and in 1954 at the Scottish Dairy Show two cows from Northern Dairy Shorthorn herds in the Kirby Stephen district won the Supreme and Reserve Supreme Championship on type for Shorthorns.

Production, too, has not been forgotten, and numbers of members have taken up milk recording with enthusiasm. The highest recorded Shorthorn herd in the northern region of the M.M.B. in 1953 was that of Mr. E. J. Robinson of Kiln Hall, Farleton, Holme, Carnforth, who averaged 11,563 lb. for fifteen cows on twice-a-day milking; and the highest yielding cow of any breed on twice-a-day milking in the counties of Cumberland, Westmorland, Northumberland, and Durham in 1952 was "Longburgh Kate", who gave 20,041 lb. milk in 301 days with her seventh calf. This cow has given in all 117,601 lb. in seven years on twice-a-day milking.

In health, the Northern Dairy Shorthorn stands high, with 95 per cent of registered herds attested, while its constitution, having been bred and reared on hillside pastures, is second to none. The fine quality of Northern Dairy Shorthorn bullocks has caused a great demand during recent years, and this demand continues to grow. Northern Dairy Shorthorn bullocks were included in an experiment on beef production at Cockle Park, where they were outwintered in fields which had no shelter and were sometimes covered with frost or snow. They had only silage as additional food, but they graded on the average A or A plus up to Super Special, with liveweights up to 13 cwt. More dairy farmers than ever are now coming to recognize the qualities of a breed which can yield such results, realizing that a cow which calves regularly once a year, gives reasonable quantities of milk in return for economical feeding and average management, and remains in good health over a considerable number of years, is a sound economical proposition.

H. J. Shutt,
Secretary.

Northern Dairy Shorthorn Breeders' Society

17. SCOTCH BEEF SHORTHORN

ALTHOUGH there are some breed protagonists who argue to the contrary and who can, at a pinch, extract evidence to sustain their claims, the truth is that the early histories of all breeds of cattle are based on rather uncertain data. It is said, for example, that the Earls of Northumberland were breeding short-horned cattle for two hundred years before the Colling brothers came to the fore in 1780. One fact that is certain, however, is that there existed, in the Tees valley around Darlington, a race of cattle known as the "Teeswaters", whose characteristics were large frames, good bone, a capacity to attain great weight, and a heavy milk yield.

The principal early development of these cattle was due to Charles and Robert Colling, who, through Robert Culley, had become acquainted with the methods of livestock improvement so successfully pursued by Bakewell of Dishley in the development of Leicester sheep and long-horn cattle. The influence of the Colling brothers was to produce an animal of moderate size, shapely and early maturing, with well-sprung ribs, short legs, good milking qualities and a good hide.

The original improved Shorthorn was a dual-purpose animal, bred for both beef and milk. Nowadays, though all strains of Shorthorns trace back to common foundations, it is recognized that more than a century of specialized breeding to beef or to milk has developed two distinctive types. The beef type of Shorthorn is the Scotch Shorthorn, known in the nineteenth century and at the beginning of this century as the Aberdeenshire Shorthorn—an indication of the great part played in its development by Aberdeenshire breeders.

The chief attributes of the modern Scotch Shorthorn, which have placed the breed on its present high pedestal in the cattle world, are early maturity and the ability to grade-up thin-fleshed cattle of other breeds. World-wide emphasis on improved standards of living has underlined the imperative need for expanding beef production. In all great producer countries beef is now the ultimate aim, and with the main problem being how to ensure expansion quickly and economically, the world, not for the first time, is turning to the Scotch Shorthorn. That this is not too great a claim to make is confirmed by the fact that in 1953, the last year for which figures are available, no less than 754 Scotch Shorthorns were exported from this country—far more than the total exports of all other beef breeds.

The Scotch Shorthorn bull does not colour mark his progeny, but he possesses another far more valuable asset in a greater degree than bulls of other breeds—the prepotent capacity to pass on his inherent good qualities to his stock.

The basic qualities of profitable beef production are maximum flesh on the valued portions of the carcass and maturity in the shortest possible time. The official results of two recent practical experiments carried out in the U.S.A. and Canada by independent official organizations leave no shadow of doubt regarding the reliability of the claim that the Scotch Shorthorn does, in fact, produce the most beef at the least cost in the shortest time.

At Canada's Federal Experimental Station the detailed results of progeny testing showed that, among the thirty-nine animals of all breeds on feeding test, the most beef at the least cost was put on by the Beef Shorthorns. In the U.S.A., where the Michigan Beef Cattle Feeding Project, sponsored by Michigan State College, is accepted as a model for the whole country, the rates of gain recorded in the last experiment presented a familiar pattern.

THE CATTLE OF BRITAIN : 17. SCOTCH BEEF SHORTHORN

Of the first ten places, no fewer than nine went to Beef Shorthorns. The Shorthorns made an average daily gain of 2.221 lb., and the issued report of the project stated that "the predictable advantage shown by Shorthorns, especially at younger ages, is in line with general results, which show that Shorthorns lead in early maturity as well as economy of gain". It is worthy of note that in yet another U.S. investigation, in which calving percentages were taken into account, the Shorthorn percentage of live births was considerably higher than that of other breeds. There can be no argument about results based on such practical tests.

The Scotch Shorthorn quickly acclimatizes itself to extremes of temperature, thrives in time of plenty and exists in good fettle in periods of scarcity, and as a result it is found in almost every country in the world where improved cattle are kept. Almost all the "new" breeds carry Shorthorn blood, and the most successful of all, the Santa Gertrudis, is five-eighths Shorthorn.

It is manifestly impossible to catalogue completely the successes in inter-breed contests that have come the way of Scotch Shorthorns in recent years. But, even though efforts are being made, as we have seen, to determine values for meat production apart from show-ring performance, we must recognize that the latter still means something.

In Canada the Shorthorn is out on its own. At the Toronto Royal Winter Fair it is a positive achievement to win the inter-breed steer championship, but Shorthorns have won it fourteen times and on several occasions have stood reserve. Moreover, four of the last five inter-breed champions have been Shorthorns. In the U.S.A., at the Chicago Feeder Show, the Shorthorns have produced eight out of nine inter-breed car-loads of yearlings, and have won the Chicago International Grand Championship four times in the past nine years. This run of successes dates from the change-over by the authorities from classes by weight to classes by age—further proof that the Shorthorn does what is claimed for it. The South African story of Shorthorn achievement is even more conclusive. The inter-breed championships at the Rand Show began in 1948, and since then a Beef Shorthorn has won on five occasions and three times has stood reserve.

At home, the Scotch Shorthorn has to its credit such recent performances as the winning at this year's Royal Show of the Burke Trophy award for the best pair of beef animals, while a Shorthorn bull stood reserve in the Queen's Trophy contest for the best beef bull. At this year's Royal Highland Show a three-quarter Shorthorn was judged the best of the fatstock entries. Scotch Shorthorns have also stood reserve for the Norfolk Trophy at Smithfield in the past two years, and in 1952 the supreme champion there, described as the "best steer ever shown at this show", was 50 per cent Shorthorn.

The Scotch Shorthorn bull, as the foregoing details amply illustrate, has demonstrated for years past his ability to give quality and weight for age from all manner of cows. Individual breeders may differ as to the precise proportion of Shorthorn blood essential to the production of high-grade commercial cattle, but they agree as to the necessity of the Shorthorn cross. There is no other breed that has had, or is likely to have, such a universal influence in livestock improvement.

*D. G. Noble,
Secretary,*

Scottish Shorthorn Breeders' Association

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Better Rural Housing Many farmers and landowners are faced with the problem of providing modern housing for farm workers, and a keen interest in this subject was shown at a recent A.L.S. Conference held at Hitchin, under the chairmanship of Mr. G. R. H. Nugent, Parliamentary Secretary, Ministry of Agriculture and Fisheries.

There are over four million houses in Great Britain which are more than 65 years old, and whereas some of these are past saving, a large proportion are structurally sound and could last for many years. It is an important part of the Government's housing policy that these dwellings should be improved so that they offer a reasonable standard of comfort and equipment and provide good homes for another generation or more. Agriculture is very much concerned in this matter. If the present standard of farming is to be maintained, an adequate and contented labour force is essential, but it is evident that many workers are no longer prepared to live in cottages lacking amenities which most of us take for granted, and this is undoubtedly one of the causes of the shrinking labour force.

The grants payable under the Housing Repairs and Rents Act, 1954, should encourage many landlords to carry out improvements which hitherto have been uneconomic. As was pointed out at Hitchin, if a landlord is unable to obtain grant for the improvement of a cottage, he may be forced to carry out a makeshift job so as to avoid burdening the tenant with a large rent increase. On the other hand, with the aid of a grant an infinitely better scheme could be executed for about the same net capital expenditure, and it would probably prevent the loss of another worker. If no improvement work is done, the cottage will in time become permanently unfit for occupation, and eventually demolition may be the only answer. Obviously, the nation cannot afford to let something like a third of its total stock of houses decline into slums.

Government grants for the improvement of houses have been available since 1949, but few owners have sought help, partly because they were unaware of the assistance available and partly because some people felt that the conditions attached to the grant were too strict. These conditions have now been modified, and it may be helpful to consider briefly the present requirements.

Any house that needs modernization is eligible for grant if, when the work is done, it will provide a satisfactory dwelling for at least fifteen years. Any other building which is suitable for conversion into a house or flats is also eligible. When improved or converted, the building must conform to certain minimum standards. These include freedom from damp, and the provision of proper ventilation, adequate water (including hot water for domestic purposes), an internal, or otherwise readily accessible, toilet, a bath (preferably in a separate room), a sink with proper drainage, adequate gas or electric lighting where available, suitable facilities for heating, satisfactory facilities for storing, preparing and cooking food, and a fuel store where required. Although this standard is aimed at, nevertheless in special cases something less can be accepted.

Grants are available to the owner or to a leaseholder who has at least fifteen years of his lease still to run. There is no means test and grants are available to any owner who is willing to modernize his house. No maximum cost is stipulated, but the grant is limited to half the cost of the improvement, with a maximum grant of £400 per dwelling (£800 in respect of a house

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converted into two dwellings). The grants are administered by local authorities, to whom all inquiries should be made, and owners are recommended to consult the local council's surveyor at an early stage to make sure that the work proposed will be acceptable for grant-aid. If the owner cannot meet his share of the cost of improvement or conversion, the council can lend him the money at a low rate of interest, just as they can advance money to cover the cost of any necessary repairs not covered by the grant.

Following improvement, the house may either be occupied by the owner or a member of his family. Alternatively, it may be let either as a tied cottage or at a rent not in excess of the figure assessed by the local authority. In the case of a house already let on a statutory tenancy, the owner is entitled to increase the rent by 8 per cent of the net cost of the improvements.

So far as agricultural cottages are concerned, who will gain from the improvements? The owner gains because his property is given a new lease of life, which will reflect on the capital value; he should also receive a reasonable return on his expenditure by way of increased rent. The occupier gains because he gets the advantage of modern housing conditions, which give greater comfort and convenience. The farmer gains by having a contented worker, and this must help towards the efficient running of his farm. The taxpayer and ratepayer gain because dwellings are preserved which would otherwise become derelict.

With all these benefits to be had, surely local authorities and owners should do all in their power to bring about the improvement of houses which are reasonably sound but lack the refinements of modern living?

R. F. Smith

Farming Cameo : This district lies within the triangle formed by Bury St. Edmunds to the north, Haverhill to the west and Hadleigh to the east, and covers approximately 132,000 acres. Compared with the national average, farms are large: 85 per cent of the acreage comprises farms over 100 acres and 45 per cent farms over 300 acres. The average annual rainfall is 25.5 inches.

The soil of the district consists mainly of boulder clay, but merges into a chalky boulder clay towards the west, where it crops out to the chalky soils of Cambridgeshire. Towards the East Suffolk border, glacial sands and gravels are superimposed on the clay, particularly in the valleys of the River Stour and its tributaries. The nature of the soil makes drainage of prime importance in crop production and, despite substantial efforts to tile- and mole-drain the land during and since the war, there is still much heavy soil which would benefit from better drainage.

The farming is traditionally arable, and the area ranks for inclusion in the "Granary of the British Isles". Cereal-growing is highly mechanized and interest centres on high-yielding, stiff-strawed varieties of corn suitable for combine harvesting. There are approximately 300 combine harvesters in the district, and their introduction has brought into prominence the need for grain storage and drying equipment. Bulk grain handling facilities are likely to appear in the district within the next few years. Where barley is concerned, farmers generally have malting quality as a first objective, and in good years the quality can be, and is, very satisfactory.

With the establishment of sugar beet factories at Bury St. Edmunds and Ipswich thirty years ago, beet growing has developed quickly and today forms the main cash crop of the root shift, for the soils are not particularly suited

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to potato-growing. Sugar beet yields have risen rapidly over the last decade and last year achieved a record of more than 13 tons per acre. As with sugar beet elsewhere, the availability of labour exerts a marked influence on the distribution of the crop. Within the limits allowed by heavy land, the mechanical harvesting problem has been met, but there is an urgent need for new methods of reducing the labour requirement in the spring.

A flax factory in the south of the district attracts a small acreage of this crop locally, but the greater proportion is drawn from Essex. Peas have become popular in recent years, replacing beans to some extent. Good yields and quality are produced for the London and Birmingham green pea trade and, in recent years, for canning. Since the end of the Second World War a number of horticultural holdings have sprung up, concentrating particularly on quality apples and soft fruit. The correct siting of these enterprises from both drainage and frost susceptibility aspects has required careful consideration.

The acreage of grass is small and the standard of its management generally leaves something to be desired. But with the introduction of leafy strains of grasses and the wider use of lucerne the usual dry period at the end of June and through July, with its consequent deficiency of grass, has, to some extent, been overcome. A move towards greater self-sufficiency in milk production has become apparent as a result of the wider use of silage, sugar beet tops and home-grown cereals.

Despite the predominantly arable scene, livestock do play an important part in the income of some farms. The dairy herd of the district comprises about 4,000 cows, although this is less than the war-time figure. Pigs have increased in numbers very rapidly and now stand above the 1939 level. Sheep figures are slowly creeping up, and it is hoped that this trend will continue.

A recent development in the area is the introduction of herbage seed-growing as a means of introducing a break in fields where continuous white straw cropping has been practised in the past, and it provides a useful cash crop without the need for stock. The benefits of ley farming in this traditionally arable area are slowly becoming apparent and, with the help of the £5 per acre ploughing grant and the recent development of a comprehensive water supply throughout the district, this method of farming is likely to become more general.

F. S. D. Brown
District Advisory Officer

The Mechanic on the Farm: A welding set can be extremely useful in the workshop of even a small farm. The skill

7. Welding
needed to use it efficiently can soon be acquired with practice, and instruction in the essentials can be obtained from the agent who supplies the outfit. But good welding sets are fairly expensive, and considerable thought should be given to choosing the most suitable kind to deal with the jobs most likely to crop up on the farm.

The first decision is whether the set shall be gas or electric. A gas outfit is usually more completely portable and it can be used for cutting. It can also be used as an ordinary blowpipe to heat metals and so do a lot of work for which a forge would otherwise have to be lighted. Electric outfits can be used to weld in awkward places, and often the component to be repaired need not be dismantled from the machine to which it belongs. They provide a more local heat than gas welders, and therefore are often less liable to cause distortion in the part being welded.

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Gas welding uses an oxy-acetylene burner to provide the heat necessary to fuse the metal which is used as a filler. The oxygen and acetylene are bought in cylinders, and the supply to the blowpipe can be regulated by a fine-adjustment tap. For welding steel, the proportion of the two gases required is one that will give a neutral flame, that is to say, a flame that will neither add oxygen to the fused metal nor add carbon to the heated steel. For some metals, such as brass, an oxidizing flame must be used, while for building-up worn steel surfaces, special wear-resisting, alloy-steel filler-rods are used with a carburizing flame.

Gas welding outfits can be used for flame-cutting sheet metals. When iron or steel is hotter than its ignition temperature, oxygen will cut it by combining with the iron to form a liquid oxide of iron, which solidifies and forms a scale. It is best to use a special nozzle in which the two jets are arranged annularly; the inner nozzle carries the supply of oxygen which does the cutting and the outer one the mixture of oxygen and acetylene for the flame to heat the metal.

In arc welding, as in gas welding, a filler metal is generally used. Electrodes usually consist of a filler metal rod covered with a coating of flux, but carbon electrodes are used for welding thin gauge metal.

A current of high amperage is needed for arc welding, but a fairly low voltage will suffice. To strike the arc, as much as 90 volts may be required, but as soon as the arc has been started the voltage drops to 40 volts or less. A high striking voltage is generally advantageous, but too high a voltage at the running arc brings poor quality work. If a mains supply of electricity is used, the voltage has to be lowered by transformer or rotary convertor. A simple transformer, giving alternating currents at the electrodes, is cheapest. Its efficiency can be improved by fitting condensers to the welding transformer to reduce the load on the mains, and most sets incorporate these condensers.

Welding by direct current gives finer results in some kinds of work than welding by alternating current, but for farm implement work, alternating current welding is quite satisfactory.

Where the mains electricity supply is not adequate for a sizable arc welder, or where there is no supply at all, it is sometimes worth while buying an engine-driven outfit. These can be mounted on small pneumatic tyred wheels, and thus become almost as portable as an oxy-acetylene outfit.

H. J. Hine

Turkey Conference at Norwich The recent Conference on turkey production and marketing at Norwich left no doubt in the minds of those present of the firm optimism amongst its leading members as to the future of the industry. Before the Conference began, the turkey demonstration centre at the Norfolk Agricultural Station had been officially opened by Mr. G. R. H. Nugent, Parliamentary Secretary, Ministry of Agriculture and Fisheries, who pointed out that it was largely due to the generosity of our American friends that funds had been provided to enable the centre to be built. This latest development at Sprowston had been most timely, as research was urgently required to ensure the continued success of the industry. Turkey producers and the British Turkey Federation, he said, were to be congratulated on the initiative shown in increasing production of quality carcasses without relying on any stabilized or guaranteed prices, from which some other branches of the industry obtained considerable benefit.

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Discussing marketing problems, Mr. Nugent felt that table chickens in the United Kingdom were within measurable distance of competing in price with red meat. To popularize the sale of turkeys, a market would obviously have to be developed for the turkey joint. The success of this undertaking would depend largely on the retail shops having refrigerators to handle the product, and he suggested that some market research on the subject would have to be undertaken before definite steps could be made towards stimulating demand.

Mr. Leonard Robinson gave details of an investigation into marketing problems he had recently undertaken. The number of turkeys in England and Wales, he said, had increased from 777,000 in 1950 to 1,238,000 in 1953—an increase of approximately 60 per cent—and the numbers are still rising. Against this background of higher home production and the possibility of increasing consumption from overseas, Mr. Robinson felt that since more than 85 per cent of the people in Great Britain earned less than £10 a week, turkey producers would be well advised to pay close attention to evolving a satisfactory marketing system. "It must be remembered," said Mr. Robinson, "that the turkey industry is dealing with a highly perishable product which is offered in a speculative and extremely seasonal market. Therefore, short of a Government support price, there appears to be no way of securing real stability."

Although a national marketing scheme—which many felt should be compulsory—had been suggested in some quarters, Mr. Robinson had found little support for this proposal among either producers or the trade. The average producer appeared to concentrate upon the production side of his business and to pay little attention to marketing. The small man might be justified in taking the risk of finding a market at the last moment, but it was surprising to see the number of large producers, with thousands of pounds' worth of stock on their hands as Christmas approached, who had no very clear idea of how they were to dispose of the birds.

In Mr. Robinson's survey it had been apparent that very few turkey rearers had installed refrigeration plants, and on most farms adequate cooling for market was entirely dependent on our fickle climate. Expansion of the deep-freeze process was necessary, and would go a long way towards solving the marketing problems, which arose largely because 90 per cent of the demand was confined to the Christmas season.

The standard of presentation and grading of home-produced turkeys, in the opinion of Mr. Robinson, left much to be desired and, although there had been some improvement in recent years, the position was still unsatisfactory. Mr. Robinson considered that the practice of selling the best quality birds direct to consumers and then dumping the remainder on the market was all too common and did not enhance the reputation of home-produced stock in the distributive trades. The Ministry's national "Recommended" grades for dressed poultry included divisions for turkeys, but they had not been applied on a national scale. "These grades should be given more publicity" said Mr. Robinson, "or, if they are not acceptable to the majority, some new recommendations should be made, as national grades are necessary and should be applied nationally."

Many producers, added Mr. Robinson, were hoping for all-the-year-round sale of turkeys, but there was a general feeling that if birds were available in quantity at all seasons they would not experience the present keen demand at Christmas time and prices would be lower. "While price and supplies will have their influence on year-round sales," he continued, "the habits of people are not easily changed. The turkey is a traditionally Christmas dish

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and it seems improbable that the average consumer will have such a surfeit of turkey during the rest of the year that he will buy other meat for the festive season."

W. J. S. Fordyce

Soil Survey of Great Britain The sixth report on the progress of the Soil Survey of Great Britain, which was published last month, gives very brief descriptions of the areas and the new soils found in the 540 square miles surveyed during 1953, so that these soils can be recognized in areas where similar geological formations occur, but where no soil survey has yet been made. Comparison of the maps in this report with those in *Report No. 3* shows that there has been a great extension of the work into new areas.

Copies of the report may be obtained from any Sale Office of H.M. Stationery Office, or by post from P.O. Box 569, London, S.E.1., price 4s. 6d. (4s. 9d. by post).

Report on the Animal Health Services in Great Britain, 1953 The Report on the Animal Health Services for 1953*, which was published last month, is the latest in a long series of official reports

which was initiated nearly ninety years ago from the Cattle Plague Department of the Privy Council. As in previous years, accounts are given of the outbreaks of contagious diseases of animals during the year, the progress towards the eradication of bovine tuberculosis and other diseases, and the preventive measures taken against the introduction and spread of disease from abroad. During 1953 there was much less foot-and-mouth disease and anthrax, but many more outbreaks of swine fever and fowl pest. This was the first year in which there was no outbreak of sheep scab, and the opportunity has been taken to review the progress of the control of the disease up to what is hoped to be its final eradication.

Other sections of the Report deal with the measures for the protection of animals in transit by sea, rail and road, animal health questions in connection with the export trade, the research work carried out by the Ministry's Veterinary Laboratories and Investigation Service, and artificial insemination.

Management for Milk *Management for Milk* is the title of a new colour film made by the Plant Protection Unit under the direction of Miss Elsa Goodwin on Mr. R. Seymour's 95 acre farm in the Sussex Weald. Not everything is done "according to the book." It is quickly apparent that here is a farm with the "common touch"; where such capital improvements as have been made are modest and immediately concerned with, quite simply, getting a better return per acre. And Mr. Seymour has done it. Milk from an attested herd of Friesians is the predominant interest, and good grass the predominant food. The cattle graze the leys from early spring to late summer, and during the winter are yarded on tripod hay, good quality pit silage, kale and dredge corn. Little has to be spent on imported feedingstuffs. A flock of Kerry Hill sheep running with a Suffolk ram, follow behind the cattle for a closer bite. Labour?—just the farmer and two men.

This is a film of obvious interest to the small farmer, and it can be borrowed by any farming organization from Plant Protection Film Unit, Bolton House, 61 Curzon Street, London, W.1., without charge.

16 mm. Kodachrome. Running time 30 minutes.

* Obtainable from any sale office of H.M. Stationery Office, or by post from P.O. Box 569, London, S.E.1., price 3s. (3s. 3d. by post).

BOOK REVIEWS

The Dancing Bees. KARL VON FRISCH. Methuen. 16s.

Very many books have been written about the honeybee, but Professor Karl von Frisch's book is quite different from all the rest. Here is the fascinating story of how bees communicate with one another, of how they tell their hive-mates what crops they should look for and where they are to go in search of them, of what bees can see and smell and taste, of their sense of time, of how the work of the colony is organized, and of how bees find their way about—all told in delightful, simple language by the scientist in whose laboratory these things were discovered.

This is a book about bees, not about beekeeping, and it will appeal to all who are interested in the behaviour and natural history of animals. The author has written for the ordinary reader about "the interesting part of the subject, without the ballast of practical instruction that a handbook must provide or the comprehensiveness of a learned book", and few will dislike his selection from the abundance of material which was at his disposal. The facts which he describes are not embroidered in any way, and they are in many respects far stranger and more interesting than they would have been if the poetic fancies of earlier writers on the subject had happened to be true.

Professor Karl von Frisch is a great biologist, and only secondarily a bee-monger. This enables him to approach his subject with a unique breadth of vision, to compare the activities of the honeybee with those of humans and other forms of life, and to make his work interesting to everyone. He is also a good teacher, who has acquired the common touch and an ability to write about his discoveries in simple language which everyone can understand and enjoy. That is a very real achievement, because many scientists are so immersed in the details of their subject that they cannot see its simple outlines, and so used to long words and jargon that they are unable to convey their meaning with clarity and precision.

The Dancing Bees is the supreme introduction to a fascinating subject. The quality of the information which it provides is beyond question; the book is a joy to read, and it is deservedly recommended by The Book Society.

C.R.R.

Training for Horticulture. W. J. C. LAWRENCE. Allen and Unwin. 9s. 6d.

Under this title Mr. Lawrence has revised and enlarged his book *The Young Gardener*, which was first published in 1943 as an introduction to the theory and practice of gardening. But the new title is rather misleading, for only five pages relate to training and no details are given of the nature of any training, except that for the practical gardener. The range of careers in horticulture, as described by Mr. Lawrence, is severely limited by the author's long association with gardening, and he ignores the many openings for trained horticulturists in the colonies, in firms concerned with the manufacture and distribution of fertilizers, insecticides, fungicides, weed-killers and agricultural machinery, in the marketing of horticultural produce, and in plant improvement and the production and distribution of seeds.

With great skill, Mr. Lawrence has succeeded in compressing chemical, physical, biological and pathological aspects of horticultural science into less than a hundred pages. Teachers of horticulture and rural science in grammar and secondary modern schools, whose training has been mainly academic, will find these chapters on the sciences useful when planning curricula and organizing formal and informal instruction. Student gardeners who are fortunate enough to have had some science training will discover in them adequate outlines to be filled in with further reading and study, while for those working alone the supplementary list of books should prove very helpful. Most young gardeners, however, still leave school with little formal science training, and many are keen to extend their knowledge by means of day continuation classes, evening courses and reading. To them, Mr. Lawrence's close compact of definition and precept may well be incomprehensible.

The book is written with great verve and enthusiasm and it is not afraid of the imperative. Mr. Lawrence is undoubtedly an inspiring teacher of the great craft of gardening, and his book will assist ardent gardeners to stimulate and direct interest and enthusiasm in their younger brethren. It maintains the tradition among gardeners that success is linked with good personal qualities, and the practical advice on how to read and observe, how to learn basic facts and integrate them with practice, and how to tackle examination questions, is invaluable. In dealing with the acquisition of skill in routine garden operations, and indicating how these operations can be made the basis of an expanding knowledge of plants and their habits, Mr. Lawrence makes a strong appeal to pride in garden craftsmanship.

H.W.M.

BOOK REVIEWS

The English Countrywoman. G. E. and K. R. FUSSELL. Andrew Melrose. 30s.

In principle, this book is a history of the English countrywoman from the days of Henry VIII to the later years of Victoria. In it we read of her home and her routine, her clothes, her garden and her recreations, the food she prepared and the manner in which she prepared it; and we trace, generation by generation, the major themes of social and physical change in the countryside. We watch, for instance, the rural household which once baked its own bread, brewed its own beer and made both its own clothes and its own soap, gradually lose its traditional self-sufficiency; the slow spread of feminine education which created a new type of woman and also both increased and hardened the distinction between rich and poor; and the manner in which invention and industry lightened the heavy load of labour and discomfort that were such an inevitable part of our ancestors' existence. The story is enlivened by various picturesque anecdotes and recipes and illustrated by over seventy plates from contemporary sources.

In practice, however, this book is not really a history of the English countrywoman. It is a collection of historical information about her, a catalogue of facts and quotations from which the reader must, in large measure, extract for himself a considered, connected story. And his task is not rendered easier by the vagueness of the book's terms of reference, for throughout most of this period the English countrywoman was also the normal Englishwoman. No doubt, the lady of the manor, the farmer's wife and the labourer's wife had many things in common, but they were very different people, leading very different lives, and the authors' failure to distinguish adequately between them has led to confusion and repetition. More generally, this book falls between two literary stools. On the one hand, it is too incomplete and casual to become a work of reference. For instance, if the domestic life of manor and cottage can be included in a so-called "Farmhouse Social History", why not the domestic life of the vicarage which has long been one of the most important of rural homes? And should not the two pages rightly devoted to Eleanor Ormerod be supported by a reference to her invaluable autobiography in the list of authorities consulted? On the other hand, it is too incoherent to give much pleasure to the average reader. The book shows evidence of great industry and wide reading, but, unfortunately, neither of these virtues can redeem the faults of poor presentation.

N.H.

Sweet Corn. WALTER A. HUELSEN. Interscience Publishers. 80s.

Written by the Professor of Vegetable Crops at the University of Illinois, this book is the fourth in a series of monographs on the chemistry, physiology and technology of food and food products published under the generic title *Economic Crops*. It is truly a mine of information on sweet corn, set forth in an orderly fashion, and consisting mainly of apt epitomes of the relevant literature scattered throughout many scientific and technical journals, with connecting criticism and comments by the author. Where necessary, missing information is supplied from data on the closely-related flint and dent maize.

Starting with a brief history and taxonomic description of sweet corn, Prof. Huelsen then describes the older open-pollinated varieties and considers at some length the problems involved in breeding the new hybrids which have now replaced them. Much of the information is directed to American growers for the canning industry, which utilizes the bulk of sweet corn crops in the U.S.A. There follows a detailed survey of problems of germination, which often proves a limiting factor in sweet corn adaptation, and of growth and maturity, with considerations of their practical significance and the role of mineral nutrition and fertilizers.

About one-third of the book is taken up with various aspects of the sweet corn canning industry and of the American system of contracting and handling. There are valuable descriptions of canning operations, not previously brought together in one volume, and even guidance on how to detect starchy corn in samples of canned sweet corn! The chapters on freezing, salting and dehydrating will be of particular interest to the new frozen foods industry in Britain.

In view of the comparative newness of the crop—it has been cultivated by white man only in the last hundred years—it is unfortunate that Prof. Huelsen confines himself almost entirely to North American aspects. He mentions the canning industry in Australia only *en passant*, while the use of sweet corn as a horticultural crop in England is ignored. From the British farmers' viewpoint, this book is too technical for direct use, but as a work of reference for agriculturists connected with the canning industry it will prove of great service. The book could be even more useful if all the references were collected at the back, instead of at the end of each chapter, and especially if titles of original papers were cited.

There are thirty illustrations, mostly of seeds and seedling anatomy, although for the price one would have expected at least a photograph of an edible ear, if not of the whole

BOOK REVIEWS

plant. Author and subject indexes are provided, and the standard of printing is very good, except that gene symbols should be in italics or bold type for clarity. When the book is reprinted, as undoubtedly it will be, Prof. Huelsen would also be well advised to adhere to either the Fahrenheit or the Centigrade scale, and not mix them indiscriminately from one paragraph to another, as now.

G.H.

Planning a Farm for Higher Productivity. (Farm Economics Branch Report No. 41). University of Cambridge. 4s.

Economists have for a long time been accused of too often looking backward, but this report shows very positively that in the field of Farm Economics there has been rapid progress in recent years in developing methods of applying economic data to future planning. The budgeting technique used so successfully in the United States and only recently adapted for use in Britain is in this report demonstrated to be a most valuable aid in advisory work on farm management, and in particular in the reorganization of the various enterprises making up a farm unit.

In the Eastern counties more than 50 per cent of farm costs are represented by labour and machinery charges. With this evidence in mind, the writers analyse the present organization of a farm of 150 acres with detailed attention to the amount of labour used during the farming year. In order to study the benefits in terms of reduced labour costs to be expected from increased mechanization, a number of alternative plans for reorganizing the existing farm enterprises are investigated.

The first plan envisages a degree of mechanization sufficient to enable a reduction in the regular labour force. By using the budgeting method, the plan is shown to give higher output per man and a higher profit for the farmer without reducing production from the farm. The alternative plans assume that the farm has been fully mechanized, but in addition, by changes in crop and stock enterprises, they endeavour to make full use of the present labour force. Of particular interest are the results of introducing a dairy herd, which increases profits by a moderate amount, and introducing more pigs and poultry, which gives a substantial increase in both profit and total output for the farm.

The authors very wisely point out that the budgeting method is not used to forecast what profits will in fact be made, but as a means of comparing the relative advantages of a number of alternative farming plans.

L.W.O.

For Farmers. Edited by CLYDE HIGGS and KENNETH PIPE. *Daily Express* Publications. 2s.

An increasing and welcome interest in agricultural affairs is being taken nowadays by the national press. Agriculture is, in fact, "news". Thus the publication of this 72-page booklet by one of our great national dailies will not cause the surprise that it might have done a few years ago.

Its aim is to provide a readily available and easy-to-use source of information on some of the complexities of modern farming, presented under such heads as scientific breeding, balance cropping, better grassland, mechanization, electrification, finance, and the law. The work of a number of bodies administering to agriculture, such as the N.A.A.S., Milk Marketing Board and the National Farmers' Unions, is faithfully explained, and there are some simple explanations of the Fatstock and Cereal Marketing Schemes which should prove invaluable to many who find new ideas initially difficult to digest.

There are a few points of criticism. It is not made clear, for example, that the Agricultural Mortgage Corporation will make improvement loans on the same basis as the Land Improvement Company, and there is some confusion about the regulations covering the sharing of responsibility for maintenance and repairs as between tenant and landlord. A little more might have been said, too, about the work of the Agricultural Land Service. And in the section devoted to fatstock, neither the Deadweight Guarantee Payments nor the Ministry of Food Grade and Deadweight Scheme is mentioned.

These, however, are comparatively minor blemishes in a considerable amount of useful information. Although the booklet is addressed to farmers, there is much in it which could, and indeed, should, be read with advantage by townsmen. *The Daily Express* are to be congratulated not only on their initiative in producing it, but also in keeping the price down to such a reasonable figure.

L.W.T.

BOOK REVIEWS

The Fens. ALAN BLOOM. Hale. 18s.

Many pass through the Fenland, but few stop to explore it. They generally confine themselves to the main roads leading to the coast, hastening as fast as they can to the pleasures of the Lincoln and Norfolk seaside resorts. Yet the Fenland is full of interest, not only in what is there at present, but by virtue of what has gone on during the past two thousand years.

Much has been written about the Fens, but mostly the literature has dealt with one or another specific aspect. This very readable book by Alan Bloom should tempt many to spend a little time exploring away from the main traffic routes, for it covers a wide field; from the origin of the Fens and their history, through the great struggles in draining and keeping the land free of water (which were not always successful), to the present-day people and the problems facing those who depend on the control of water for their livelihood. With such a wide casting, it is almost inevitable that parts of the book are rather sketchy, but there is enough to whet the appetite for a more detailed study of this rather neglected area of the country. It is a pity that the opportunity was not taken to include a short list of books to extend the reader's interest.

The author was born, brought up, and farmed for a time in the more southerly part of the Fens, and no doubt this is the reason why the greater part of the book is devoted to the area with which he is most familiar, and for the consequent brief account of the Lincolnshire Fens. Mr. Bloom seems to regard the siltland which lies at a higher level around the Wash as more or less responsible for many of the drainage difficulties in the Black Fens. But if the silt had not been deposited, and many miles of embankment had not been constructed, it is doubtful whether the Black lands would have been drained at all! The enclosure of land from the sea in the Wash area is briefly touched on, and the author mentions that in spite of the many mechanical inventions of recent years, less land has been enclosed in the present century than in the previous ones.

Present-day drainage problems are considered, and the many "bones of contention" which exist are discussed. The drainage of the land and the prevention of flooding is as great a problem today as it ever was. The struggle is continuous, and great foresight is required on the part of those responsible for preserving this fruitful area of England.

J.C.W.

A Short History of Wool and its Manufacture. E. LIPSON. Heinemann. 12s. 6d.

There is no technical boggy about this book; it should prove informative and interesting for a wide field of readers. Largely it is a story of human endeavour applied to the production and processing of a vital commodity within the context of social, economic and political developments over a number of centuries.

For the wool-grower, there is an account of the evolution by breeding and environment of the world's sheep population. The ancient competition between the English longwools and the shorter stapled Spanish sheep is shown, first in Europe, and then after transportation to the Dominions. There, the dominance of the Merino began to give way, with the advent of refrigeration, to the dual-purpose cross-breeds, which supplied both looms and larders. Mr. Lipson also shows the effect of closer settlement on the organization of sheep husbandry in the Dominions. Enormous sheep ranches are dying out and more flocks are becoming integrated in general farming systems. Information available since the book was written shows that this trend has been greatly stimulated in Australia and Britain after the rise of wool prices late in 1950.

For the woolman, Mr. Lipson describes the development of trade practices and the economic and social effects of new inventions. It is interesting to trace the roots of the present-day horizontal integration of the wool industry back into the past, where the origin of the modern credit and contract system can also be seen. The earlier reputation of Britain's wool metropolis for fraudulent work, referred to in a quotation from an old Methodist hymn:

*On Bradford likewise look Thou down
Where Satan keeps his seat.*

has now been outlived.

The student of political economy will find material in the account of the struggle between the English landowning and manufacturing interests, which resulted for a time in the prohibition of wool exports and the "owling", or smuggling, trade.

Because of the human story which runs through its pages, the book has a general appeal. But history is seen to best advantage in contrast with the present; while the author moves confidently and convincingly through the mists of the past, his most recent facts are some-

BOOK REVIEWS

times sketchy and shaky. One of the best chapters is that on English wool. Some may read with surprise that even today England "is at once a large producer as well as a large importer of wool". This should give heart to the efforts of English growers, whose improved marketing methods are regaining for their wool more of the reputation it enjoyed centuries ago.

S.R.B.

The Agricultural History Review (Vol. II). 1954.

At the meeting in 1952 which led to the formation of the British Agricultural History Society under the presidency of Sir James Scott Watson, several speakers suggested that the publication of a journal should rank high among the activities of the proposed body. The second issue of the *Agricultural History Review* shows that already the Society has gone far to establishing itself as the "central clearing-house" for information on our rural past.

The greater part of the *Journal* is devoted to articles by prominent economic historians, and notably a plea by Dr. Hoskins of Oxford for more resolute and detailed study of regional agricultural history, and a valuable bibliography of recent work on the Enclosures. It also contains the domestic news of the Society and various Notes and Comments, including a pleasing reference to modern scholars grinding corn on a prehistoric type of quern and felling a small Douglas fir with a flint axe, and concludes with a dozen pages of book reviews.

In all, it is a most effective combination of discussion, record and the results of research. Its quality and importance are obvious from the list of contributors on the title-page. Nobody interested in farming history can afford to neglect either this *Journal* or the Society that produces it.

The *Journal* at present is only available to members of the Society. The subscription is a guinea a year and membership is open to all interested in the subject. Details may be obtained from the Secretary, c/o The Museum of English Rural Life, 7 Shinfield Road, Reading.

N.H.

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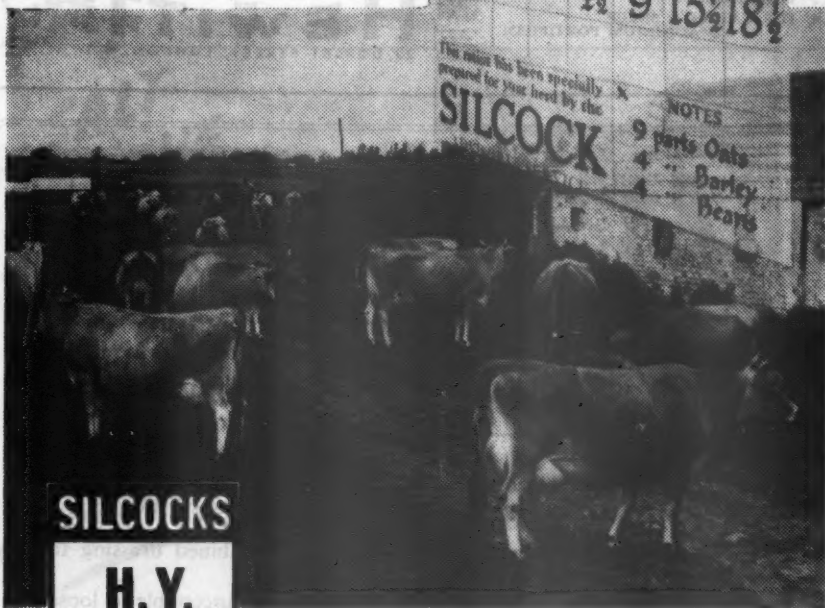
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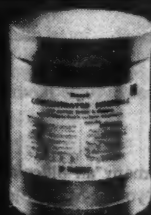
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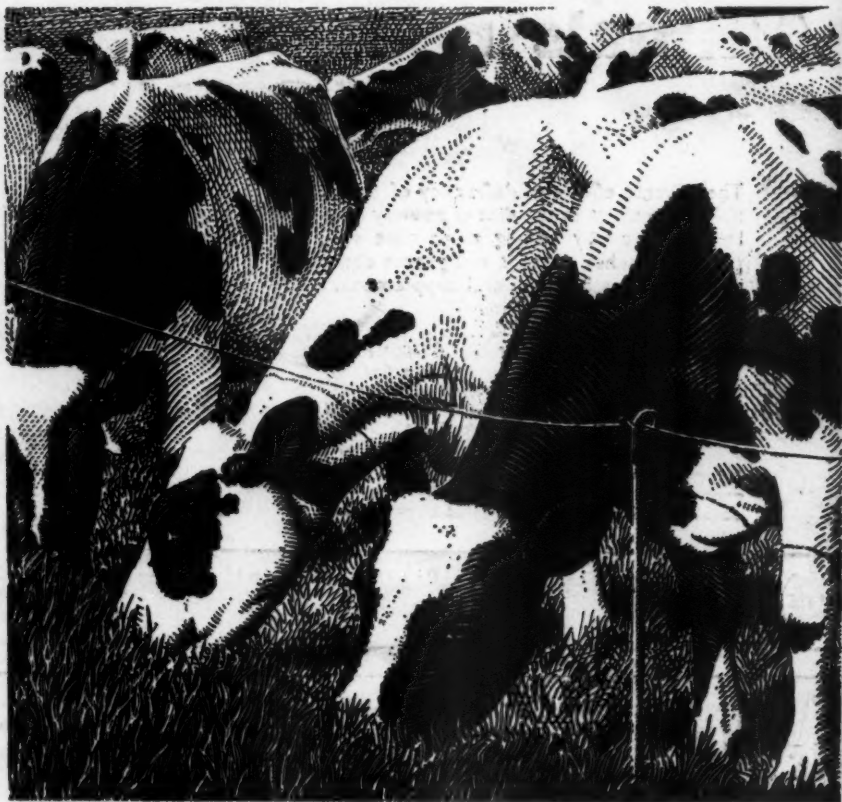
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